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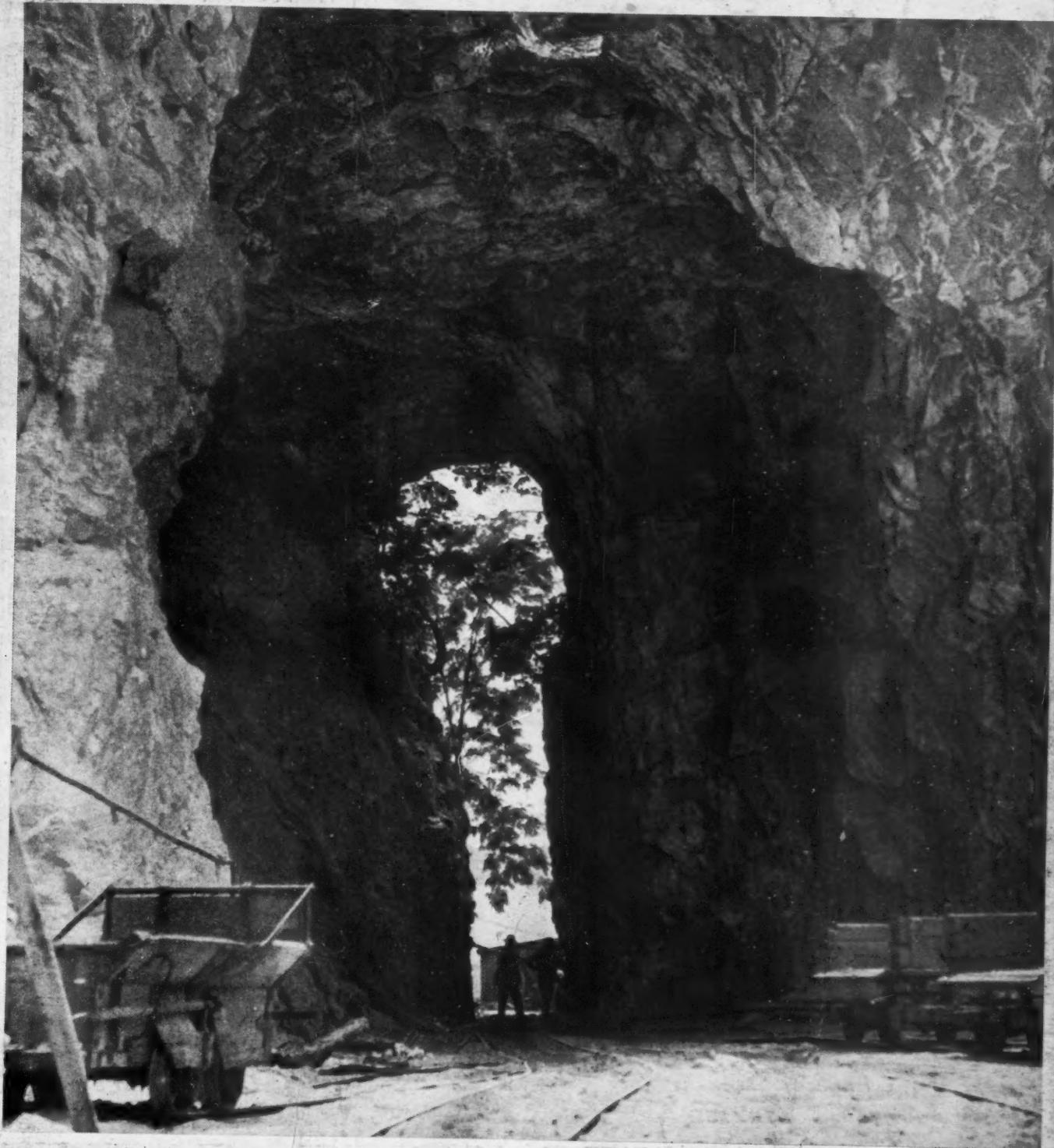
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# Rock Products

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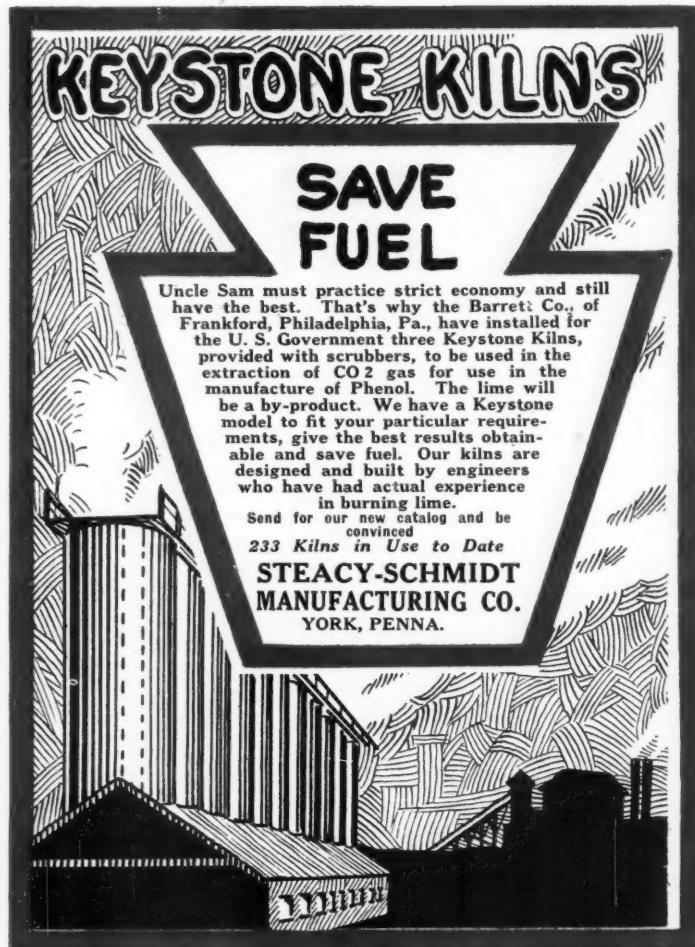
CHICAGO

OCTOBER 23, 1918



October 23, 1918

## Rock Products



**KEYSTONE KILNS**

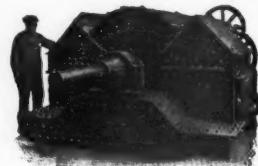
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Uncle Sam must practice strict economy and still have the best. That's why the Barrett Co., of Frankford, Philadelphia, Pa., have installed for the U. S. Government three Keystone Kilns, provided with scrubbers, to be used in the extraction of CO<sub>2</sub> gas for use in the manufacture of Phenol. The lime will be by-product. We have a Keystone model to fit your particular requirements, give the best results obtainable and save fuel. Our kilns are designed and built by engineers who have had actual experience in burning lime. Send for our new catalog and be convinced.

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when joined with service means satisfaction for you. Audubon Wire Cloth is Quality Cloth and brings uniform results and quality production.

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**WIRE CLOTH**

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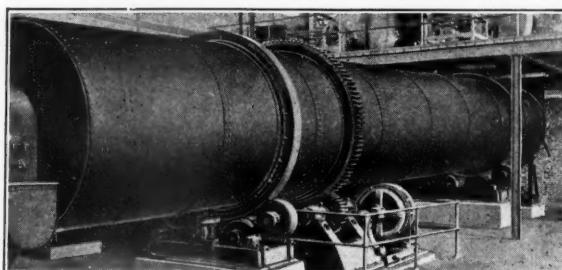
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CHICAGO WORKS,  
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# Rock Products

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NATHAN C. ROCKWOOD  
*Editor*

T. BIRCHLER  
*Assistant Editor*

GEO. P. MILLER  
*Manager*

RICHARD S. DARLING  
*Eastern Representative*

FRANCIS L. GEHR  
*Western Representative*



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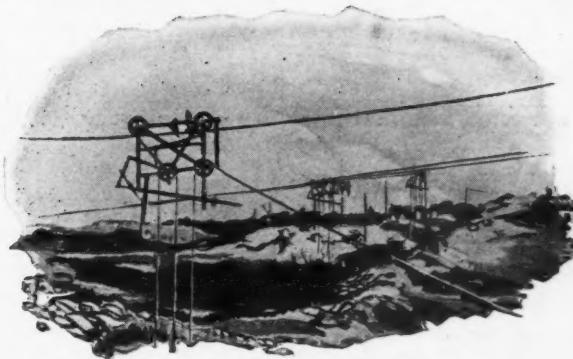
# GRASSELLI EXPLOSIVES

The confidence which the users of explosives have placed in The Grasselli Powder Co. all these years is but the logical sequence of a definite policy and, still more important, the result of deep rooted principles of manufacture. The name Grasselli is synonymous with all that is reliable in explosives. Today it stands at the pinnacle.

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**The Grasselli Powder Co.**  
CLEVELAND, OHIO

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The grit and dust raised in the handling of rock products tests rope quality and endurance as few other services do. In the face of the worst conditions Waterbury Wire Rope has established itself through its unvarying high quality of material and workmanship and great durability.

There is a Waterbury Standard Wire Rope for every purpose, and for special purposes we have a highly developed line of Armored Wire Rope and Fibreclad Wire Rope.

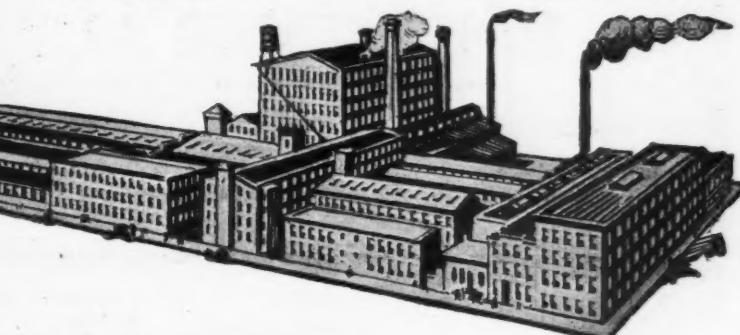
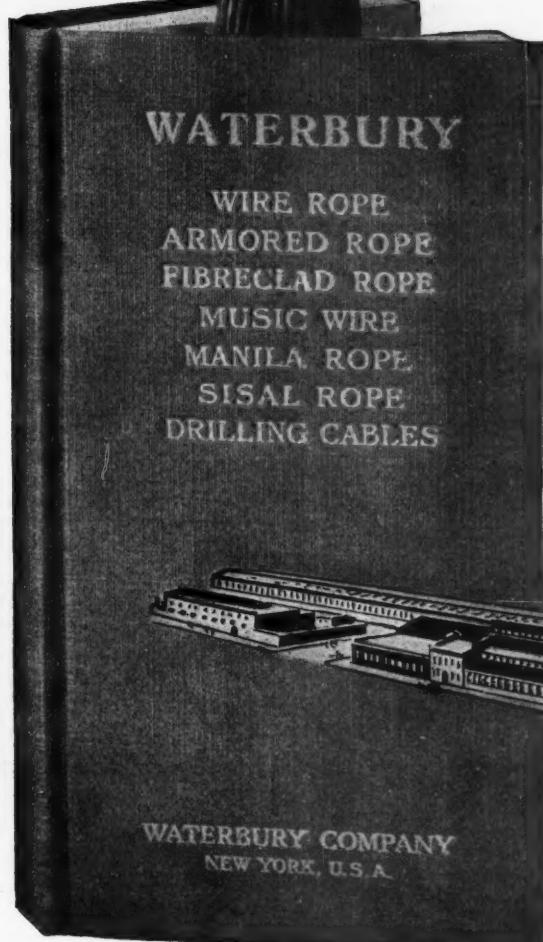
#### CATALOG

A 220 page Cloth Bound Rope Manual covering all kinds of rope—Wire, Fibre, Fibreclad Wire and Armored Wire—mailed free upon request.

## WATERBURY COMPANY

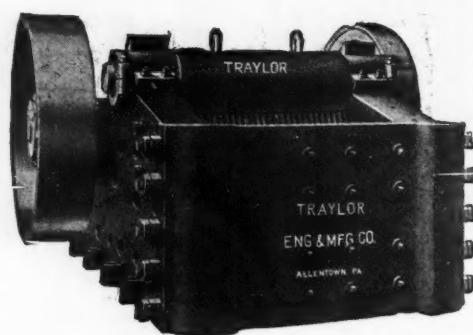
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SAN FRANCISCO.....	151-161 Main St.
DALLAS, TEXAS.....	A. T. Powell & Co.
NEW ORLEANS.....	1018 Maison Blanche Bldg.



This Mill, covering two city squares, is devoted wholly to the manufacture of Waterbury Wire and Fibre Ropes.

Saying "I saw it in ROCK PRODUCTS" will bring quick action.



THE great necessity for primary crushers of absolute strength and constant efficiency demanded the highest engineering talent and finally resulted in the

# TRAYLOR "GIANT" JAW CRUSHER

*"The Largest Jaw Crusher in the World"*

Jaw Opening 66" x 86". Weight 680,000 Lbs.

THE same principles are used in manufacturing each of the five types and thirty-six sizes—from the little one that handles four tons to the monster that crushes six hundred tons or more per hour.

Send for Bulletin RJ-2, which gives condensed specifications for five types and thirty-six sizes, constructed to fit every conceivable need required in primary crushers.

## TRAYLOR ENGINEERING & MANUFACTURING CO.

*Main Office and Works*

Allentown

NEW YORK  
LOS ANGELES

Pa.

CHICAGO  
SPOKANE



SHOWING PITMAN FOR  
SMALL 7" x 10" CRUSHER  
AND THE "LARGEST  
PITMAN IN THE WORLD"

*For better service say "I saw it in ROCK PRODUCTS."*



THE Sterling worth  
of Sterling Trucks  
has been proved by  
eleven years of serv-  
ice—solving all  
important motor  
transport problems.

## Shock-Absorbing Wood Inlaid Frame

*An Exclusive Sterling Feature*

Shocks are life destroyers—main-  
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The Sterling wood-inlaid frame mini-  
mizes destructive vibration—prevents  
crystallization—increases motor power  
—reduces noise—lengthens the life of  
the truck. Permits the use of bolts that  
stay tight, in place of rivets that work  
loose and rattle.

Built in 2½, 3½ and 5 ton capacities,  
worm drive—and the "Super Sterling"

chain drive for big loads and bad roads  
—bodies to meet all special require-  
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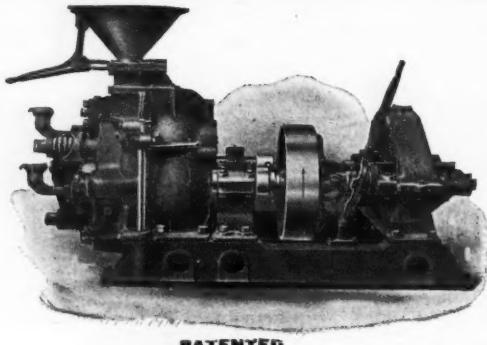
Our well equipped distributors in  
service stations in leading cities prop-  
erly represent factory standards and  
established service policy.

**STERLING MOTOR TRUCK CO.**  
*Builders of Motor Trucks exclusively for 11 years*  
Milwaukee, Wisconsin

WRITE FOR CONTRACT HAULING FACTS

*To say you saw the ad in ROCK PRODUCTS gives tone to your inquiry.*

# STURTEVANT

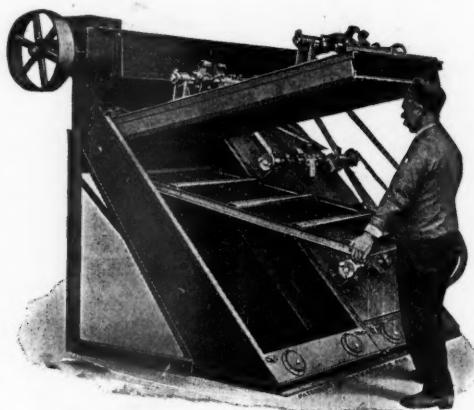
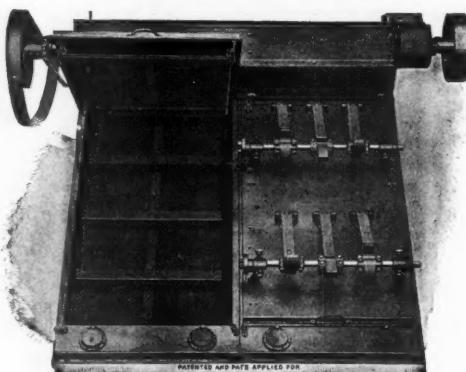


## RING-ROLL MILLS

The most durable and efficient grinder for hard and moderately hard rock or ore. Used for the reduction of Cement-Clinker, Limestone, Quartz, Ores, Granite, Trap, Phosphate, Coal, etc., etc. Hundreds in use. RANGE OF OUTPUT 8—100 MESH.

**Construction**—"Open Door" accessibility, every part within quick and easy reach. Nothing to get out of order or give trouble. Small power, slow wear. Built in single and Duplex Designs—compact and convenient, steady runners. BUILT IN FIVE SIZES.

**Action**—Material passes through hopper and is delivered on inner surface of concave, revolving ring, where it is held by centrifugal force. Three convex Rolls are strongly pressed against this centrifugally held layer of material and revolve by friction against it. The Rolls thus roll over the material, first crushing it and then wedging it off of both sides of the ring.



## NEWAYGO SUPER-SCREEN

**Unit Construction**—Each unit has screens 6 feet by 3 feet and is a complete Separator in itself. Each part is interchangeable and of the most efficient size for vibrating, capacity, handling, repair, etc. By simply bolting units together a Separator of any reasonable capacity may be obtained.

The Vibration is truly wonderful and yet nothing comes in contact with the fine wire cloth, except the material being screened. Hammers jar elastic bridges far above the screen cloth, which transforms these shocks into high-pitched vibrations, when transferred to the wire cloth. The scalper is also vibrated.

**Screen Cloth Tensioning**—The screen cloth is stretched taut and held taut, and the tension may be regulated locally or in its entirety.

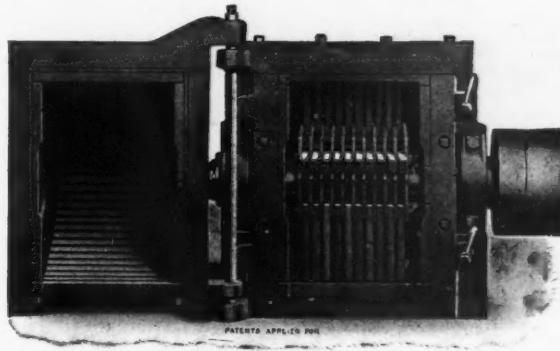
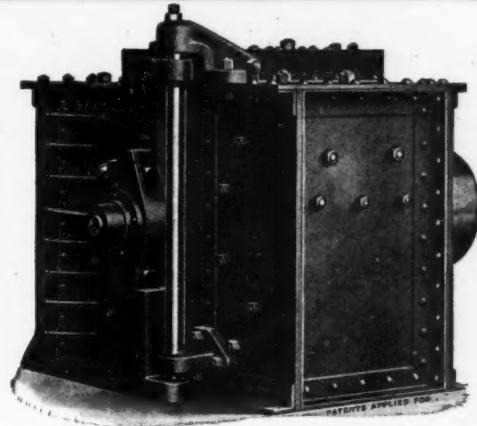
**One Finger** lifts the cover, and exposes the "Scalper" and Fine Screen. The "Scalper" slides into and is pulled out of the cover, like a drawer. The fine screen rests in the screen box, and is unobstructed by any mechanism, and is removed by simply lifting it out.

Accessibility, such as this, has heretofore been unknown.

# STURTEVANT MILL CO.

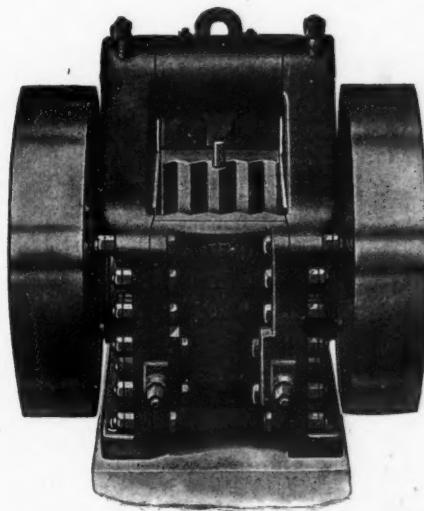
*You will get entire satisfaction if you mention ROCK PRODUCTS.*

# STURTEVANT



## OPEN-DOOR PULVERIZERS

One man in one minute can get at every part for cleaning, adjustment, repair or for the removal of iron. Shutting down a plant is costly—accessible machinery minimizes delay. It requires minutes instead of hours to get at any trouble with Sturtevant "Open Door" Machinery. Continuous operation means economy, large production, profits and small operating costs. Labor is scarce and of poor quality—most of it is eliminated by machinery, which seldom requires attention, and when repairs must be made, a simple and accessible machine pays for itself many times over.



## JAW CRUSHERS

**Action**—Double Cam and Roll giving jaws two nips to each revolution of flywheels. Run at half the speed of others for same output. Slow speed means no hot boxes or bearing troubles and smooth, steady running—cheap foundations—long life.

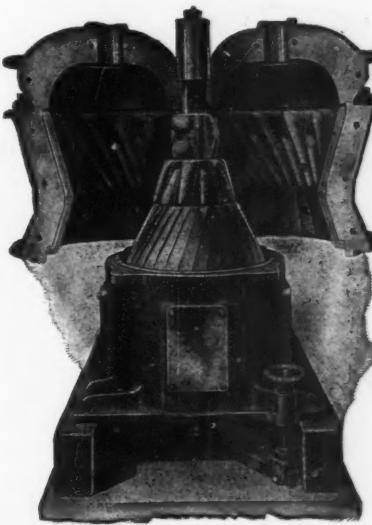
**Range of Output**—6" to  $\frac{1}{2}$ ".

**Uses**—For crushing anything crushable, that is friable. **Jaw Sizes**—2"x6", 4"x8", 5"x10", 8"x10", 6"x15", 10"x15", 6"x20", 12"x26".

**Types**—Coarse Crushers—Output: 2" to 6".

Intermediate Crushers—Output: 1" to  $1\frac{1}{2}$ ".

Fine Crushers—Output:  $\frac{1}{2}$ " to 1".



## ROTARY CRUSHERS

### WITH OPEN-DOOR ACCESSIBILITY

**Uses**—For crushing large pieces of soft and moderately hard materials to 1" or to corn size and smaller. A most popular and widely used machine. Used largely as a preparatory crusher for Pulverizers.

Some of the materials being crushed in Rotary Crushers

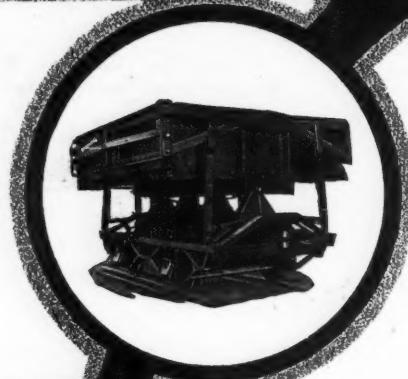
—Lime, Gypsum, Talc, Phosphate, Shale, Clay, Fullers Earth, Coke, Carbon, Chalk, Coal, Cement-Clinker, Sulphur, Caustic, Chemicals, Bauxite, Barites, Oyster and Clam Shells, Colors, Facings, Brick, Salt, Soapstone, etc.

**Sizes**—Five. **Capacities**— $\frac{1}{2}$  to 20 tons per hour.

# HARRISON SQ., BOSTON

*The advertiser wants to know that you saw his ad in ROCK PRODUCTS.*

# Our New Catalog



Shows some of the cars we have made—some of the appliances that work to your advantage, but at the same time it should be thoroughly understood that we do not attempt to sell a ready-made car to any customer.

We give you ideas—our engineering force is at your service, but we make the cars you need, to fit your particular conditions.

Because we give each plant exactly what it needs, in cars that stand the strain and the tear, that do the work with the minimum attention and upkeep expense—that is why WATT cars are the criterion in your line of industry.



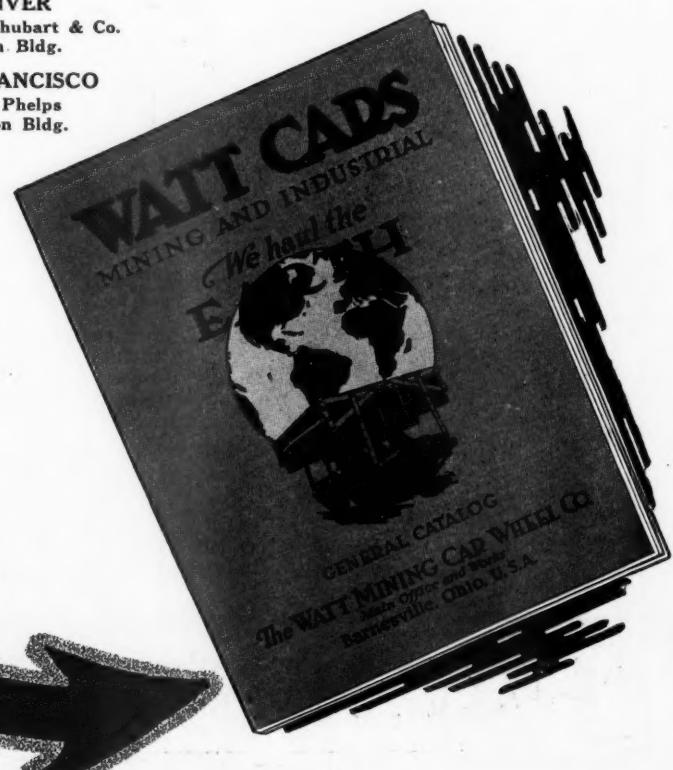
*Separate catalogues for Mining Cars, Industrial Cars, Ore Cars, Wheels, Couplings sent on request*

**THE WATT MINING CAR WHEEL CO.**  
BARNESVILLE, OHIO



**DENVER**  
Lindrooth, Shubart & Co.  
Boston Bldg.

**SAN FRANCISCO**  
H. D. Phelps  
Sheldon Bldg.



*It gets immediate attention if you mention ROCK PRODUCTS.*

# Rock Products

Vol. XXI

Chicago, October 23, 1918

No. 13

## Labor Saving and Labor Conservation in Rock Products Industries

Now Is the Time to Study Your Operation and Plan for Improvements to Meet After-War Conditions

**O**PINION as to conditions following the war appears to be unanimous. All look for unusual activity in the building industry, particularly in highway building. Before a period of prosperity can begin, however, we must weather the gale for the duration of the war and the period of adjustment; but of the ultimate outcome there can be no question and he is a poor business man who does not prepare to meet it.

The close of the present operating season, which is near at hand, is attended with unprecedented circumstances. Never were the prospects of the next season so much in doubt. We have been told that little or no construction work other than that required by the various branches of the United States Government can proceed after November 1 without specific authorization. We are further told that the great bulk of Government construction work will end during the current year. Which leaves the prospects of next season's business in unhappy suspension.

The wise operator, however, does not sit down and grow gray speculating on the extent of his future business. He decides that if there is going to be any business he is going to be in position to get a fair share of it. And he proceeds to overhaul his plant and oil it up, figuratively speaking in any event.

The dominant feature of operation next year, and in all probability for several years to come, will be a scarcity of un-

skilled labor. There will be a scarcity not only because of the present depleted manpower in the industrial world, but because one result of the war will be to increase general intelligence and add to the ranks of skilled workers at the expense of the unskilled ranks. Moreover the differential in wages between the unskilled and the skilled laborer has so shrunk that there is little excuse for doing things in the old hand-way.

Consequently it behooves every operator to study labor saving and labor conservation. It will be the operator who can make one skilled operator and machinery do the work of two or more unskilled laborers, that will get the business. And this refers not only to operators in the same field, but applies broadly. Rock products operators will have to compete for labor with other industries, possibly less hazardous and generally attended with pleasanter working conditions.

Labor conservation means the introduction of safety methods and safety devices to prevent preventable accidents. The world will have enough maimed men without those who are now losing life and limb in hazardous industries. Nearly every accident can be prevented and in the future must be prevented. The time is fast approaching when the general public will not suffer the careless operator to operate at all.

The winter season is an excellent time to study your plant and to make provision against another season's accidents.

### Have You a Locomotive Crane?

THE UNITED STATES GOVERNMENT is in very urgent need of eight-wheel locomotive cranes of 15 tons capacity up. The Office of the Director General of Military Railways, Group "C," Sixth and B-sts, N. W., Washington, D. C., requests all crane owners who can possibly spare their cranes to sell them to the Government. Reasonable prices will be paid in all cases. On account of the unusual condition of the crane market, manufacturers are unable to supply the Government's needs. Therefore a direct appeal is made to crane owners. In disposing of your crane to the Government you are, of course, doing a patriotic duty, which should be compensation enough for the inconvenience you may suffer for the balance of the war period.

# Activities of Highways Transport Body

Great Multiplicity of Motor Trucks Increases Need of Good Roads—Plans for Winter Work—Eleven Regional Areas

THE WORK of the Highways Transport Committee of the Council of National Defense has been steadily growing in importance and value to the nation. It is their work which is daily emphasizing the need of good roads and more good roads.

This committee has been energetically engaged in promoting the Rural Motor Express, Return Loads Bureaus, Store-Door-Delivery, and in a general way co-operating with the Railroad Administration for the successful prosecution of the war.

One of the most important activities undertaken last winter was in keeping the main roads used by motor convoys from factory to seaboard cleared of snow. In this work they were assisted by Highway Officials of numerous states. For the coming winter with the greatly increased number of motor trucks, the committee has been planning with a thoroughness and definiteness that commands attention.

#### Will Meet Snow Half Way

To make the roads passable at all times and to fight the snow the committee has sought and obtained the co-operation of Prof. Charles S. Marvin, Chief of the Weather Bureau, who will have forecasts made from different observation points in the territory expected to be covered by the motor truck routes, at least three days in advance of the starting of trains. In this way it is hoped to be prepared to fight snow blockades.

The aid of the Highways Transport Committee was asked by Col. Charles B. Drake, Chief, Motor Transport Corps, U. S. Army. As the number of trucks will have increased enormously by winter, a clear right-of-way will be more vital than ever.

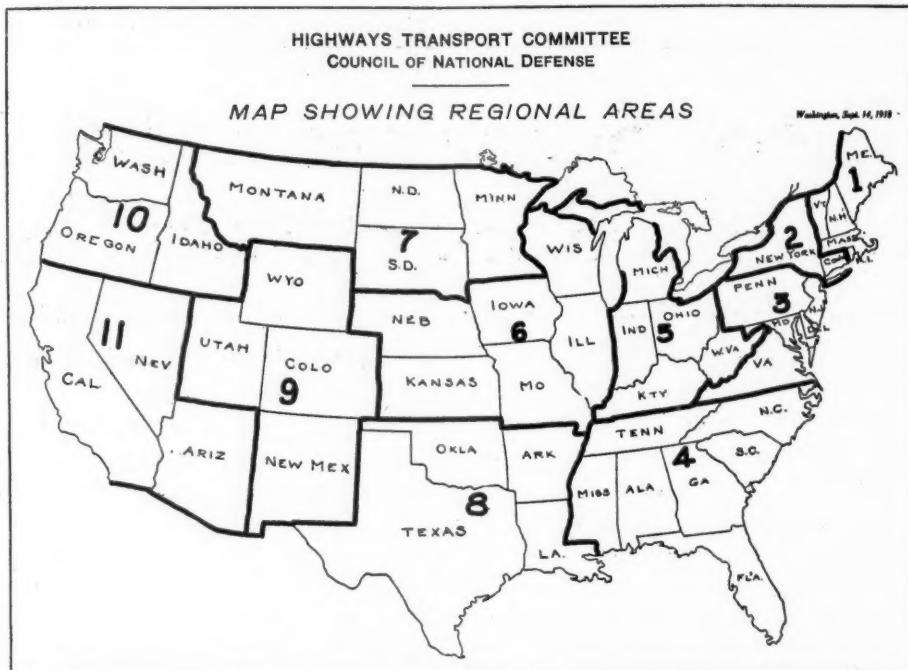
The Legislature of New York has provided Highways Commissioner Edward Duffy of that state with a fund of \$50,000.00, to be used in helping to keep clear of snow those roads to be used by Government trucks.

#### Three Big Routes Laid Out

Lt. Col. W. D. Uhler of the Highways Transport Corps has, on behalf of his organization, outlined in its entirety a plan of motor transportation over three main truck routes, one starting from Chicago, one from Detroit, and one from Buffalo and all converging at Baltimore.

Chairman Fred W. Aldred and Secretary Byron E. Pierce of the Rhode Island Highways Transport Committee state:

"Our Return Loads Bureaus are now kept exceedingly busy arranging for loads in both directions over the highways. As many as fifty calls a day indicate the large amount of business which is coming



The Chairmen: Region No. 1, J. Randolph Coolidge, Jr., Boston; Region No. 2, George H. Pride, New York City; Region No. 3, C. A. Musselman, Philadelphia; Region No. 4, Tom Winn, Atlanta; Region No. 5, Harry L. Gordon, Cincinnati; Region No. 6, John T. Stockton, Chicago; Region No. 7, Earle Brown, Minneapolis; Region No. 8, J. F. Witt, Dallas; Region No. 9, Tom Botterill, Denver; Region No. 10, Julius L. Meier, Portland; Region No. 11, L. A. Nares, Fresno.

through these offices, the tonnage of which for September was 685,200 pounds.

"This, of course, is only a very small fraction of the total tonnage arrangements most of which we never hear from since once the shipmen and truckmen are brought together they do not need to consult us further.

"Lines are in daily operation from Providence to Woonsocket, Fall River, New Bedford, Boston, Taunton and Waterbury. Two lines just starting, Providence to Hartford, three times a week. Providence to Springfield, three times a week."

The eleven regional chairmen of the Highways Transport Committee, Council of National Defense, who, following their recent appointment, attended a three days' conference in Washington, have returned to their districts, prepared to take up in an intensive way their new duties.

This formal action signalizes the transition of the problem of highways transportation from ancient to modern standards. The war has emphasized the fact that modern highways transportation problems demand modern treatment, hence the extension of the program of the Highways Transport Committee, Council of National Defense.

Expedition in shipment, which the Highways Transport Committee is daily em-

phasizing in its assistance to the Railroad Administration by diverting short hauls from rail lines to the highways, is becoming more and more vital.

#### Highways Transport Body Plan Definite Program

A DEFINITE program of specific use of the highways in support of both the war plan and the reconstruction policy for post-war times was developed by the Highways Transport Committee of the Council of National Defense in a conference of its eleven regional chairmen, representative of every section of the country, held at Washington, Sept. 17 to 19.

Cabinet officers, members of the national railroad administration, the Food Administration, the War Industries Board, the National Highways Council, the Electric Railways War Board, the Army, and the United States Senate were present. Every one of the government agencies was glad to suggest means of developing co-ordination for America's common cause.

Reports made by the regional chairmen show tonnage moved over the highways increasing at a tremendous rate, in some states as much as 400 per cent increase over last year. The Cleveland-Akron-Canot area

reported 61 per cent as much freight being moved by motor express now as the railroads are carrying. High development of the return-loads bureau, which insures most economical operation of highways transport, was noted in the state of Connecticut, with Hartford acting as the central bureau. In Cincinnati and Omaha, livestock are being carried to stockyards over the highways in increasing numbers. Rural express has reached its highest efficiency in Maryland, New Jersey, Eastern Pennsylvania and Southern New York. Arrangements have been made to connect New York State Barge canal ports with the farming communities back from it by rural express.

The Highways Transport Committee is completing countrywide organization that will number more than 15,000 committee-men, manufacturers, farmers and consumers, all working through contact with the State Councils of Defense and with the committee's Regional Chairmen.

#### New Jersey Roads to Cost Double Original Estimate

THE 655-mile system of state highways provided for in the Edge Act will cost \$30,000,000 instead of \$15,000,000, the original estimate, according to a recent statement by State Highway Engineer W. G. Thompson.

When the Edge law was passed it was estimated that the entire system could be improved for \$15,000,000, which was to be raised by a 1-mill tax on each dollar's worth of property in the state, running for five years. In a recent statement, Mr. Thompson pointed out that in the original estimate made in 1916 no allowance was made for bridges, which will cost between \$5,000,000 and \$6,000,000. In addition, the Legislature of 1917 added two highway routes, which will increase the cost by nearly \$4,000,000. He also pointed out that the cost of materials has increased from 50 to 100 per cent, labor from 40 to 70 per cent, and, without counting this increased cost of construction, it would take, in his opinion, at least \$30,000,000 to complete the highway system as planned.

#### Dead Burned Dolomite and Magnesite and Silica Brick on Essential List

WASHINGTON, D. C.—The War Service Committee on Lime announces:

Plants engaged principally in producing Dead Burned Dolomite have been placed on the Preference List in Class 4, by amendment thereto, effective Oct. 1, 1918, as follows:

Refractories—Plants engaged principally in producing refractories of any character, including fire clay brick and shapes, silica brick and shapes, magnesite brick and shapes, bauxite brick and shapes, ganister and dead burned magnesite and dead burned dolomite.

This action provides that all plants engaged in producing Double Calcined Dolomite or Dead Burned Dolomite are given

## Uncle Sam Will Use More Lime Plaster in Housing Projects

WASHINGTON, D. C.—Lime plaster will be used to a greater extent than formerly in the Government housing projects. This development was obtained through presentation of facts by the Lime Association at a meeting of the War Service Committee on Lime, held Oct. 15, and called by the Building Materials Section of the War Industries Board. The essentiality of lime is thus brought another step nearer to recognition. The notice for the meeting was received too late to send word to the District Directors of the War Service Committee.

Messrs. Camp, Hough, Shertzer and Hall represented the Association.

In an Association bulletin, R. F. Hall, General Manager, writes:

"It was decided by the War Industries Board after some discussion by representatives of the U. S. Housing Corporation, the Army and the Navy, that the existing stock of plaster board should be allocated to the housing projects most conveniently located with respect thereto, and that wherever possible lime plaster on lath should be used in all of these buildings.

"It was developed through the Lumber Section of the War Industries Board, that there is a plentiful supply of lath in the country for immediate delivery, and we succeeded in establishing the fact the general distribution of building lime plants throughout the country justifies a very widely increased use of our material in this work.

"We feel that this meeting has resulted in a distinct advantage to the lime industry."

## Road Programs for 1919 Must Be Ready by December 10

WASHINGTON, D. C.—A circular recently issued by the War Industries Board calls attention to the fact that no permits or licenses will be required by the Board for public highway improvements and State pavements when expressly approved in writing by the U. S. Highways Council.

More than 6,000 applications for approval of highway projects have been received by the Council.

#### Thousands of Applications

The United States Employment Service is now represented in the membership of the Council. The other Federal agencies represented are the War Department, Railroad Administration, Fuel Administration, War Industries Board, and Bureau of Public Roads of the U. S. Department of Agriculture.

Programs of work in construction of streets and highways for 1919, being made up under the supervision of State highway departments are to be submitted to the Council on or before Dec. 10, 1918.

#### Recent Rulings

In response to queries from local officials the Highways Council recently has made the following rulings:

The Council does not exercise jurisdiction over sidewalk construction.

Construction work, whether it costs more or less than \$2,500, should be submitted if it involves any of the materials under the control of the War Industries Board or the Fuel Administration. When materials are already on hand or are locally available, application for Federal approval need not be made.

preferential classification as an industry, no individual applications for place on the Preference List on P. L. Form No. 1 for such plants being required.

#### Lime Requirements in Housing Projects

PHILADELPHIA, Pa.—Lime plaster and lime mortar are specified by architects Rankin, Kellogg & Crane of this city for 556 six-room brick houses and 20 nine-room brick houses to be erected on the Oregon

tract, Philadelphia, and known as Project No. 503. This is to be three coat plaster work and no alternate is permitted. Royhouse, Arey Co. has the contract.

Project No. 24, Bethlehem, Pa. (1,150 houses) calls for wall board for interior lining. As this material has already been ordered, no plaster will be used. The Lime Association, however, have had 10 per cent of hydrated lime specified for use in all concrete foundation walls. Zantzinger Borie & Medary, Philadelphia, are the architects.

# Depletion Allowance for Stone Quarries Sand and Gravel Pits

Price-Fixing Committee of the War Industries Board in Fixing Iron Ore Prices Has in Effect Defined Depletion

UNDER the surface, quarry and gravel owners will find some very valuable pointers in the case of the "merchant producers of Lake Superior iron ore," who had a recent and moderately successful hearing with the Price-Fixing Committee of the War Industries Board.

#### Some Interesting Comparisons

The Lake Superior iron mines are in many cases open-pit steam-shovel propositions, exactly similar from every operating and transporting point of view to a quarry or gravel pit. The only difference then is a difference in mineral composition and a difference in uses, which are not relevant to the case under discussion.

In value the difference is not very great. Under normal conditions, a ton of low-grade ore was delivered at Lake Erie ports at from \$2.25 to \$3.50 per ton. Crushed stone under the same conditions was delivered at from 75 cents to \$1.25 per ton. In round figures, under pre-war conditions iron ore was worth three times as much as crushed limestone.

The August price of the low-grade non-bessemer ore delivered at Lake Erie ports was \$5.45 per ton. The price of crushed limestone in the same locality and under the same conditions is in the neighborhood of \$1 to \$1.50 per ton, except in the case of long term hold-over contracts. In other words the ore was worth five times as much as the limestone. The pre-war ratio has not been maintained although all the arguments for increased prices for ore apply with equal potency to the crushed limestone flux.

The ore producers admitted a profit of 4.4 cents per ton at this price (\$5.45). They claimed that the cost of producing the material and the transportation of it to Lake Erie ports was \$5.406 per ton. The Price-Fixing Committee allowed them a 25 cent per ton increase so that their present profit should be about 30 cents per ton on a selling price delivered of \$5.70 or 5 per cent.

It is pretty safe to assume that the actual cost of production of this low-grade ore is hardly more than half of this figure or in the neighborhood of \$3 a ton. Anyhow it is a safe bet that many quarrymen or gravel-pit operators would contract to get it out, wash it and treat it for better than that. The iron ore producers then have a probable clear profit of at least 10 per cent on the actual cost of production.

#### Depletion an Important Factor in Their Cost Accounting

Now for the interesting feature of their case: In the argument submitted by the chairman of their committee are the following paragraphs on DEPLETION—that item so often ignored by quarry and gravel-pit operators—that charge, which in their modesty, they so reluctantly allow for. The statement reads:

The only item of consequence in these costs about which there may be dispute is "depletion." We show an average royalty of 43.4 cents and an average depletion of 34 cents—a total of 77.4 cents. The various operators arrive at a "depletion" charge at each mine by taking the value per ton in the ground as at Jan. 1, 1913, as determined by the Minnesota and Michigan State Tax Commissions, and subtracting therefrom the royalty; or if the mine is owned in fee by the operator, this value is used in its entirety. Bankers have not hesitated to accept such a collateral value for mortgage bonds or notes, nor have careful investors refused to purchase stock issued against such values.

When ore is taken from a mine nothing of value replaces it. If "depletion" items must be considered net income, and there is no other net income, why bother with mining, its hazards and troubles?

A realty valuation used by taxing powers is always conservative. The Minnesota and Michigan Tax Commissions are personally and technically among the most able in the history of taxation anywhere.

#### Royalty Not Depletion Charge

Note that there is a distinction between royalty and depletion charges. Quarry and gravel-pit operators have stated that they were justified in a depletion charge only in case they actually paid a royalty on the material removed. It has also been stated that Federal income tax experts would not allow any more for depletion than the actual royalty payment. The case of the iron ore producers proves that the royalty need not necessarily be all the depletion charge. It may be, of course, in extraordinary cases.

The depletion charge to be made in the case of a quarry or gravel pit should be dependent only on the value of the deposit. In fixing a valuation for the ore deposits the Minnesota State Tax Commission, referred to above, stated: "Royalty was not considered a factor in determining the value of the deposit. Royalty is a payment for the ore when mined and shipped, is a division between the fee owner and the operator, in advance of expected operat-

ing profit. It may or may not be equal to the value of the ore in place."

#### Value of the Material in Place

The following argument is based on the 1914 report of the Minnesota State Tax Commission, substituting crushed stone and gravel for iron ore as it is perfectly justifiable to do. Both iron ore and crushed stone, sand and gravel are low grade minerals, which in their exploitation, recovery and marketing are in almost identically the same class.

If the rock, sand or gravel, regardless of its location, in its native natural condition is sufficient in quantity, or if the material can be made as railway ballast, concrete aggregates, or other commodity, by proper manipulation, to have commercial value, and can reach its market and obtain a price in excess of the cost of production and delivery, then such rock, sand or gravel is merchantable and marketable and has actual cash value.

The value depends upon the accessibility of the given market and its fluctuating changes. The demands as to the quantity, quality, competition with other like materials and all other conditions accompanying the sale of any product, govern from time to time in determining market price.

Because of their nature and abundance rock, sand and gravel have a market value only on the spot, by reason of industrial and transportation conditions. In general they cannot pay transportation costs of over 100 miles, or approximately the initial cost of production of the material. Consequently the value of any deposit cannot be determined from the market value of the material outside of the possible shipping zone.

It is a long, slow process requiring time and the expenditure of money to explore and develop even a preliminary mineral value in a deposit. This is a factor in giving value to a developed deposit as against an undeveloped one. The deposit has no value until discovered and very little until by drilling and test-pitting and other development work the grade and character of the deposit are definitely known.

#### To Arrive at Valuation of Deposit

To estimate the value of a deposit, selling prices in the open market must be determined over a term of years in order to equalize general average prices. Then with the general average cost of production and

delivery covering the same period of years, with royalty deducted, the balance will give the general average future operating profit value of the rock, sand or gravel in the ground.

The present worth of this future operating profit value of the material in place is ascertained by assuming a given period for its exhaustion and discounting at a given rate of interest. The value arrived at by this process is the expected profit based on the previous average profit during a period of years. This in figures of so much per ton multiplied by the estimated volume, or contents of the deposit, represents the total valuation of the deposit, upon which, as stated in the case of the iron mines, money can be borrowed or stock issued.

#### Iron Miners Add This Depletion Charge to Cost of Production

The average depletion charge in the case of mines owned in fee, at Lake Superior iron mines, is stated to be 77.4 cents per

ton, in the argument previously quoted. This is better than 12 per cent of the selling price or 20 per cent of the cost of production. And this "depletion charge" is included as a cost-of-production item, because, as the argument contends, it should not be considered net income.

In other words, the iron miners contend that they are justly entitled to a profit over and above the liquidation of the capital represented by the ore in the deposit; that they are entitled to a profit on the material as well as a profit on operation. In granting the 25-cent increase the Price-Fixing Committee of the War Industries Board apparently recognized the justice of this claim.

#### Quarry and Gravel Pit Operators Can Profit by This Experience

Taking a concrete example, suppose the profit in crushed stone gauged by average selling prices in a certain market over a term of years, has been 10 cents per ton.

And suppose the quarry still contains 1,000,000 tons of stone which can be gotten out. The value of this stone in place would then be \$100,000. It could and should be figured in the books of the company as a \$100,000 asset. Every ton as it is taken out of the quarry should be credited with an initial cost of 10 cents per ton—the DEPLETION CHARGE. If the operating cost of the plant is 60 cents per ton, the total cost of production of the crushed stone is 70 cents per ton and the real profit is the difference between 70 cents and the selling price f. o. b. plant and not the difference between 60 cents and the selling price.

Quarry and gravel-pit operators have been altogether too modest in their allowance for depletion; which may explain why goodly numbers of them have failed to profit to the extent that other industries involving far less capital expenditure and much less hazard have profited.

## W. P. Carmichael Discusses Depletion of Sand and Gravel Pits

MY VIEWS on the subject of a proper depletion charge to be added to the production cost of sand and gravel, have undergone a marked change within the last two or three years. This change was altogether the result of my own personal experience in operating gravel plants. At one plant, we have about 140 acres of gravel land, which contains approximately 150,000 tons to the acre. Most of this ground we have owned for a number of years, having paid for it an average price of \$250 per acre. Formerly we regarded a nominal charge of 1 cent a cubic yard as ample to provide for the ultimate total depletion of the land and interest on the money invested during the period of depletion. At this rate the return was approximately \$1,000 an acre and viewed from the standpoint of a sufficient return to justify the investment, was entirely satisfactory.

It was not until we purchased a small tract, which lay adjacent our main tract, and after commencing to use the material therefrom, that our eyes to real situation were opened.

In buying this land, we had assumed that the character and extent of the deposits were about the same as of our main deposit, which we had pretty thoroughly tested, on one side, and a tract owned by another corporation which had also been tested, on the other. We had, however, not proceeded very far until we had encountered some strata, which proved that the deposit on this piece of land was not as suitable for the purpose for which we were producing material as our own, and we had to abandon it for the time, because the material could not be used as concrete aggregate.

While we have not as yet reduced the value of this tract on our books because we see a possible use for it in the future, we will have to make a great modification in its value and consequently suffer a book loss for which our former depletion charge was not sufficient to provide.

After this experience, in attempting to arrive at a proper depletion charge, we came to the conclusion that in order to be certain that our original investment and a proper return on same would be realized, we must provide for a number of items other than returning land charges, and as we now view the matter this item must be large enough to cover:

1. The return of the original investment together with interest on same for the average time of use.

2. Absorption of the cost of development features, which will disappear when the land is wholly depleted and have absolutely no value, such as construction of tracks, drainage, water supply, clearing, building, and plant depreciation, other than that provided for in operation costs, for when the entire tract of land for which the plant was installed, had been used up, the plant will have only salvage value which is but a small fraction of its original cost.

3. To provide for possible economic changes which would rob the owners of the potential value of the business. These changes may be brought about:

(1) By the changes in freight rates or transportation facilities. The writer knows of one plant in northeastern Indiana representing an investment of \$30,000 or \$40,000 in land and equipment, which with the exception of a

small salvage value and of the original agricultural value of the land, was a total loss to its owners when the railway on which it was located was abandoned and track removed. Another similar instance in western Indiana where a company established a plant and did a thriving and profitable business for several years until, when a change of freight rates destroyed the market equilibrium, the company was compelled to go out of business.

(2) The discovery and development of deposits in localities which formerly afforded a market for the output of the plant, or the introduction of new competing materials. An instance of the latter exists in the growing use of slag which, being a by-product and of much lighter weight, enables its producers to compete in territory formerly served by stone or gravel plants only. As an illustration of this, a number of gravel plants in the vicinity of Youngstown, Ohio, have been greatly crippled by the growing use of slag as a concrete aggregate and road making material in that territory and in other instances crushed-stone companies have been forced out of business by the competition of more recently established gravel and sand plants in the territory served by them, it being impossible to compete with the products on which production costs were less.

4. To provide for unexpected and sudden changes in the character of the deposits not known or anticipated when the land was bought or the plant established,

unless the most careful examination of the character of the deposits had been made previous to purchase of the land or the establishment of the plant. These changes are not only possible but in some degree may be expected in all gravel or stone deposits. It is much easier to arrive at a determination of the character and extent of a stone deposit than it is of sand and gravel, since it is much easier to secure a section of the deposit of stone by means of the core drill than it is of sand and gravel and the writer has known of a number of instances where large investments were made in plants only to find that the character of the deposit was such that it could not be profitably operated. Of course, no company of experience would invest largely without first having endeavored to ascertain the extent and character of the deposit, but however great care may be taken to get at the facts in a gravel deposit, the changes in strata are so sudden and so great that even the most thorough examination will not always reveal them, therefore, some insurance should be provided against wiping out of supposed value in this way.

#### Unearned Increment Considered

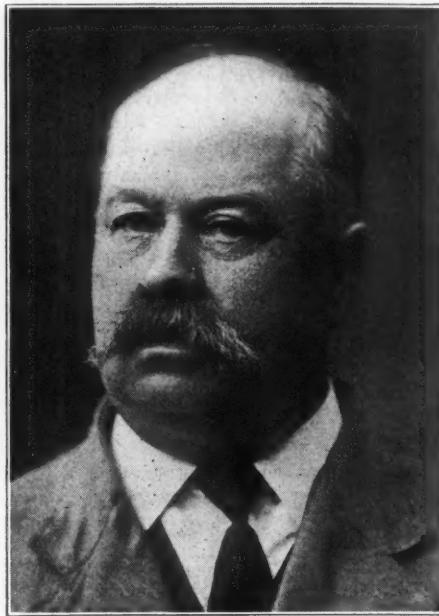
All that has been said herein before does not take into account the unearned increment in value which may have been brought about by changes in market conditions for which the owners were not responsible. This unearned increment seems to exist in the greatest degree in case of the iron deposits, especially of the hematite mines, where in most cases the land was bought for a mere nominal sum, and because of the great demand for the material values have been arbitrarily increased thousands of fold. I shall not attempt to discuss this phase of the subject, but will only say that if a company having gone into a territory at a great expense developed the market so that deposits which were formerly worth but little, have become exceedingly valuable, they are entitled to capitalize their expenditures, and what otherwise might be termed an unearned fictitious increment, is real and justified. Possibly the exceedingly high depletion charges, which are made by the iron companies are justified because of the large sums of money that is necessary to provide transportation facilities for marketing the ores.

This question of depletion charge is a very important one in its relationship to justifying costs in the eyes of the internal revenue and other officials at the present time, and the associated industries affected should see to it that the question is not decided arbitrarily or in ignorance by the revenue authorities.

W. P. CARMICHAEL,  
President, The Carmichael Gravel Co., St.  
Louis, Mo.

Hartley Withers, the editor of the Economist, of London, says: "Money spent in war time on things not needed is money given to the enemy."

## Retires After Half Century in Sand Industry.



CAPTAIN HENRY S. GARRISON OF Bridgeton, N. J., sand man, inventor of sand machinery, promoter and manager of sand properties, after fifty years of activity in the industry, has retired to emulate Izaak Walton. "I am three years behind in my fishing," he explains. He sold his interest in the Crystal Sand Co. of which he was one of the principal owners, practical man and superintendent to George Pettinos, foundry supplies, of Philadelphia.

The Captain was a sand "man" when he was a boy. He worked for his father digging sand in Salem county, N. J. While still a young man he hunted near Cedarville and discovered sand which he knew had great commercial value. He then organized the Garrison Sand Co. Later glass interests in Bridgeton organized the Crystal Sand Co., and the merging of the two companies followed with Garrison established as superintendent of works and operation.

Three plants were established at Cedarville, on the Maurice river and near Vineland. The captain is particularly proud of the Vineland plant which is said to be one of the most complete and modern in the East.

Among the numerous devices he has invented, the most recent is a contrivance for loading and trimming back sand in box cars. Captain Garrison has erected plants in New York and Pennsylvania and two in Georgia. In the many years with the Crystal company he has had two generations of many families working for him.

## New Appointments on War Industries Board

WASHINGTON, D. C.—B. M. Baruch, chairman of the War Industries Board, has made the following appointments to the

### Priorities Committee of the Board:

Henry Krumb, textile matters, machinery, supplies for copper and non-ferrous mines and smelters, etc.

Percy Holbrook, acting chairman on sub-committee on rating.

J. M. Hopkins, export matters.

W. W. Chase succeeding C. J. Howland, emergency fleet work.

Marcus B. Hall, assistant secretary.

A. W. Clapp, chief of labor section of Priorities Division of the Board.

## U. S. Employment Service Urges Necessary Men Be Kept on Jobs

WASHINGTON, D. C.—The U. S. Employment Service of the Department of Labor under date of Oct. 18, regarding industrial claims for deferred classification in behalf of "necessary" employees, said:

"It is a patriotic duty to make distinction among your employees—to claim deferred classification for such 'necessary' men and not to make claim for men who are not 'necessary.' The employer who fails to make a claim that should be made is as blameworthy as the employer, who to avoid inconvenience to himself, claims deferred classification for a man not 'necessary.'

"You should keep the Industrial Adviser informed of the needs for labor in your industry, and particularly of men of skilled trades which to your knowledge are becoming depleted. This information disseminated through the medium of the United States Employment Service will aid not merely your community but the country."

Robert F. Hall, general manager of the Lime Association, recently conferred with the Labor Section of the War Industries Board and learned that Local District Draft Boards are not required to be guided entirely by the Preference List in granting deferred classification to employees of an industrial plant. This situation is specifically covered in the Selective Service Regulations, second edition, applicable to the new draft ages, 18 to 45.

It was pointed out that there are probably a number of plants or industries of a very essential nature that have not been placed on the Preference List, and that employees of such plants or industries might properly be entitled to deferred classification, on the ground of essential employment, just the same as those of a plant that has been given this preferential classification.

It is suggested that companies that are not on the Preference List, and who may desire to make claims for deferred classification in behalf of their necessary employees, confer with the Industrial Adviser of their District Board, who understands fully the provisions of Selective Service regulations. The Federal Director of any U. S. Employment Service Office or the District Board will inform you of the name and address of the Industrial Adviser.



General view of the Beloit Sand & Gravel Co. plant showing grizzly and crusher house in pit and screen and bins

## Gravel Plant of 22 Railway Cars Capacity Operated by Five Men and a Boy

How the Beloit Sand & Gravel Co. Are Utilizing Equipment

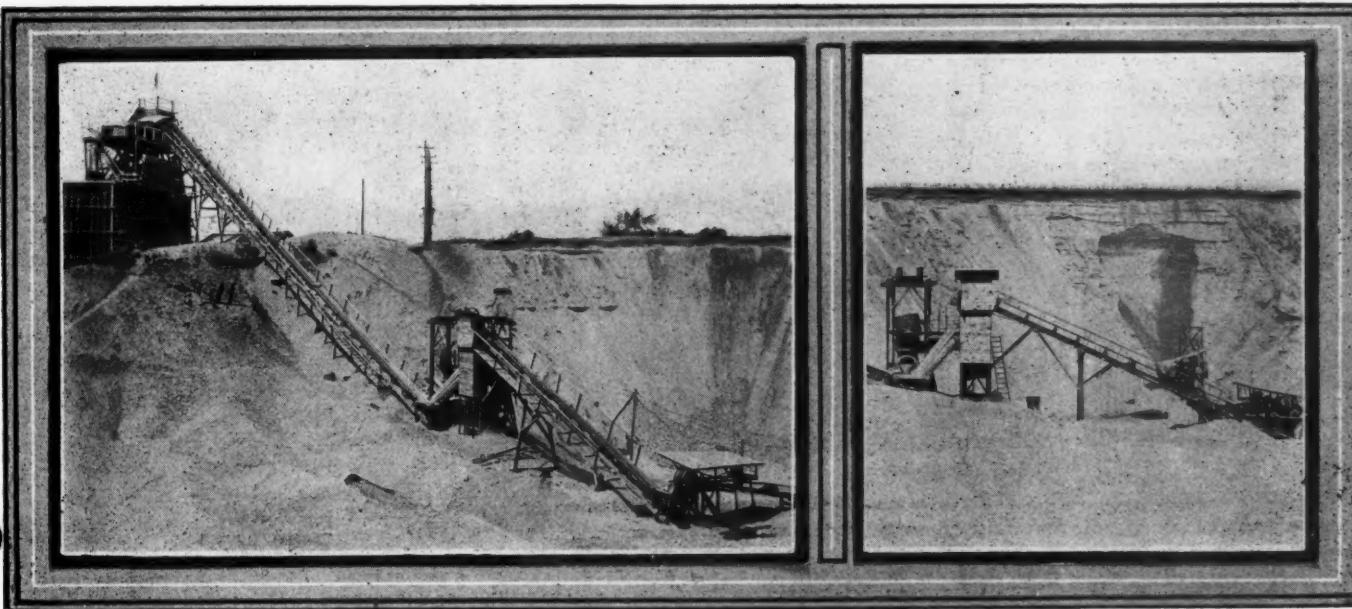
**L**ET MACHINERY do the work" is the purpose of the Beloit Sand & Gravel Co. in the operation of their plant five miles north of Beloit, Wis., on the Chicago, Milwaukee & St. Paul railroad. There the company has utilized to the fullest extent machinery that requires little attention from men. Geo. A. Rubin, president of the company, believes that few, if any other plants in the country are operated as economically as this one. If the elimi-

nation of labor while maintaining the maximum of production is a test of efficiency, Mr. Rubin asserts this has been demonstrated at this plant.

Four men, a foreman and a boy run the whole 22-car plant effectively and easily, from the digging of the material to the loading of the finished product in railway cars, and in a pinch, one man and a boy can do it, although this entails closing down the producing departments while the cars

are being loaded, resulting, of course, in a reduced production. At the time of the visit of ROCK PRODUCTS' representative, two men and a boy were running the place and had been for several days, the foreman and two other men being off duty for various reasons. They kept the plant running steadily, although the car loading was not continuous, partly because of lack of cars.

The present capacity of 22 cars can be increased by the installation of another



View from opposite bank showing digger at extreme right, conveying system, grizzly and crusher and screen plant

digger unit, the addition of two more men to work with the digger and the speeding up of the machinery. Thus the additional unit would reduce the overhead per car.

#### How Labor Is Saved

This labor saving plant is made so, partly because the material is naturally clean and has no foreign substance; so a washery and settling tanks are dispensed with. Other reasons are the utilization of a home-made digger and the use of belts for conveying material around the pit.

#### The Digger

The principal part of the digger outfit consists of an endless chain which runs over sprockets set at each end of a heavily timbered frame (or boom for want of a better name). Attached to the chain and at right angles to it, are a series of straight blades about 8 in. apart.

One end of the frame holds a fixed position on a firm foundation while the other end may be raised or lowered by a cable operated by a windlass. When in operation the frame is lowered to the gravel and by

its weight, it forces the blades down into the material a few inches. As the chain is set in motion, the blades drag or shove the material along to the digger belt.

A 15-horsepower motor, just under the roof of the digger house, supplies the power. The digger house rests on a pair of rails and can be moved forward and backward as required.

An advantage that adds to the effectiveness and economical operation of the digger is the depth of the deposit, 75 ft. The digger can stay in one position for a long time, the height providing plenty of material, needing only a man to work in the bank. Another man gives his main attention to the machinery controlling the digger. The digger and the two men produce the full daily 10-hr. capacity of 22 cars.

#### Conveyor System

From the digger belt the material drops through a chute to another belt that conveys its load to a small hopper. Here a third belt at right angles to the former, takes the material to the grizzly house

where the oversize is dropped into a No. 4 gyratory crusher. A chute from the grizzly directs the passed material onto the main belt where likewise the crushed material also falls.

The main belt climbs out of the pit a distance of 185 ft. to the top of the screening house on the surface. The structure is of wood on a reinforced concrete base.

#### Screens and Bins

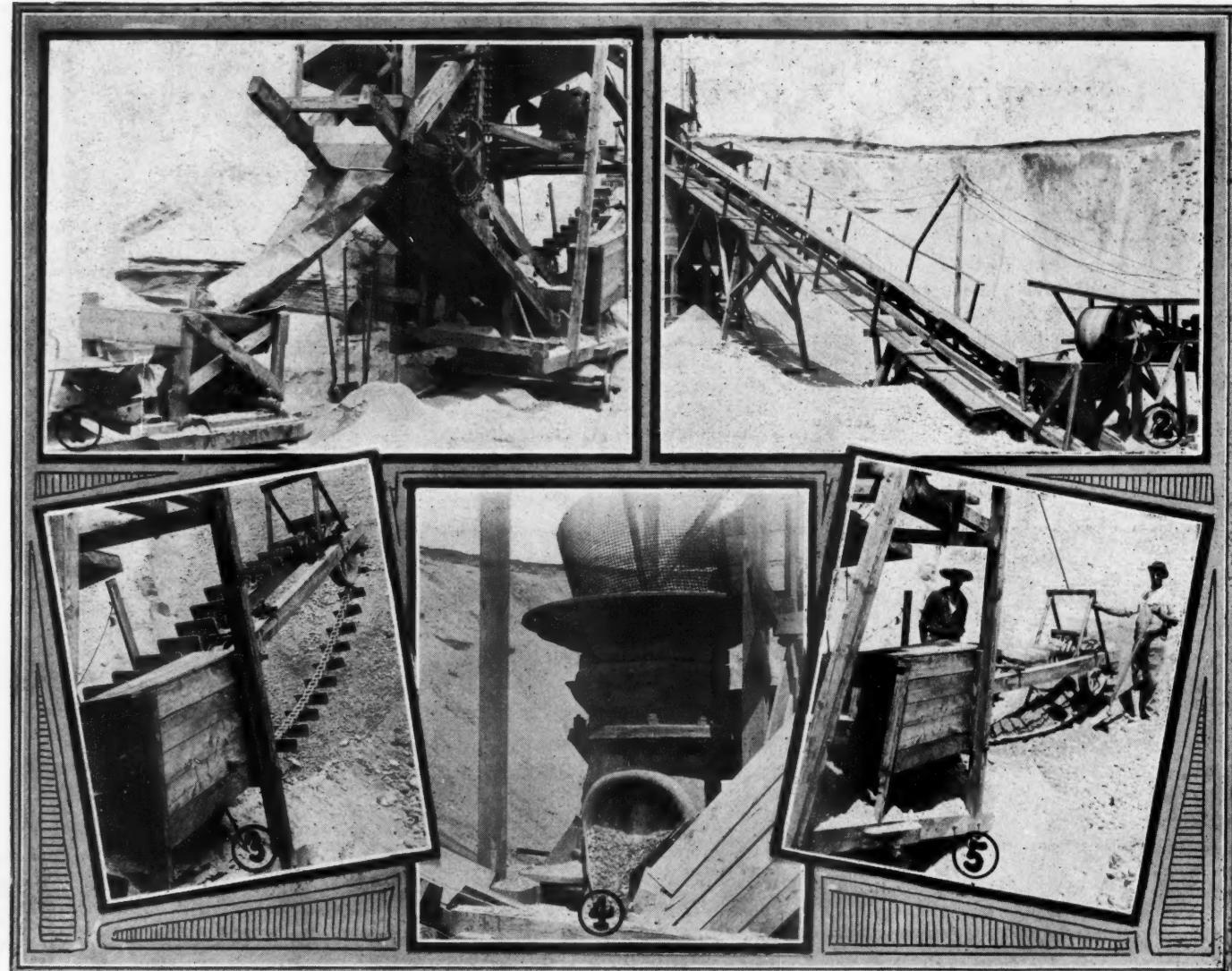
The screening plant has a screen in three sections, the first a double one, each section with a differently sized perforation.

The material passing through these screens drop through chutes into bins below.

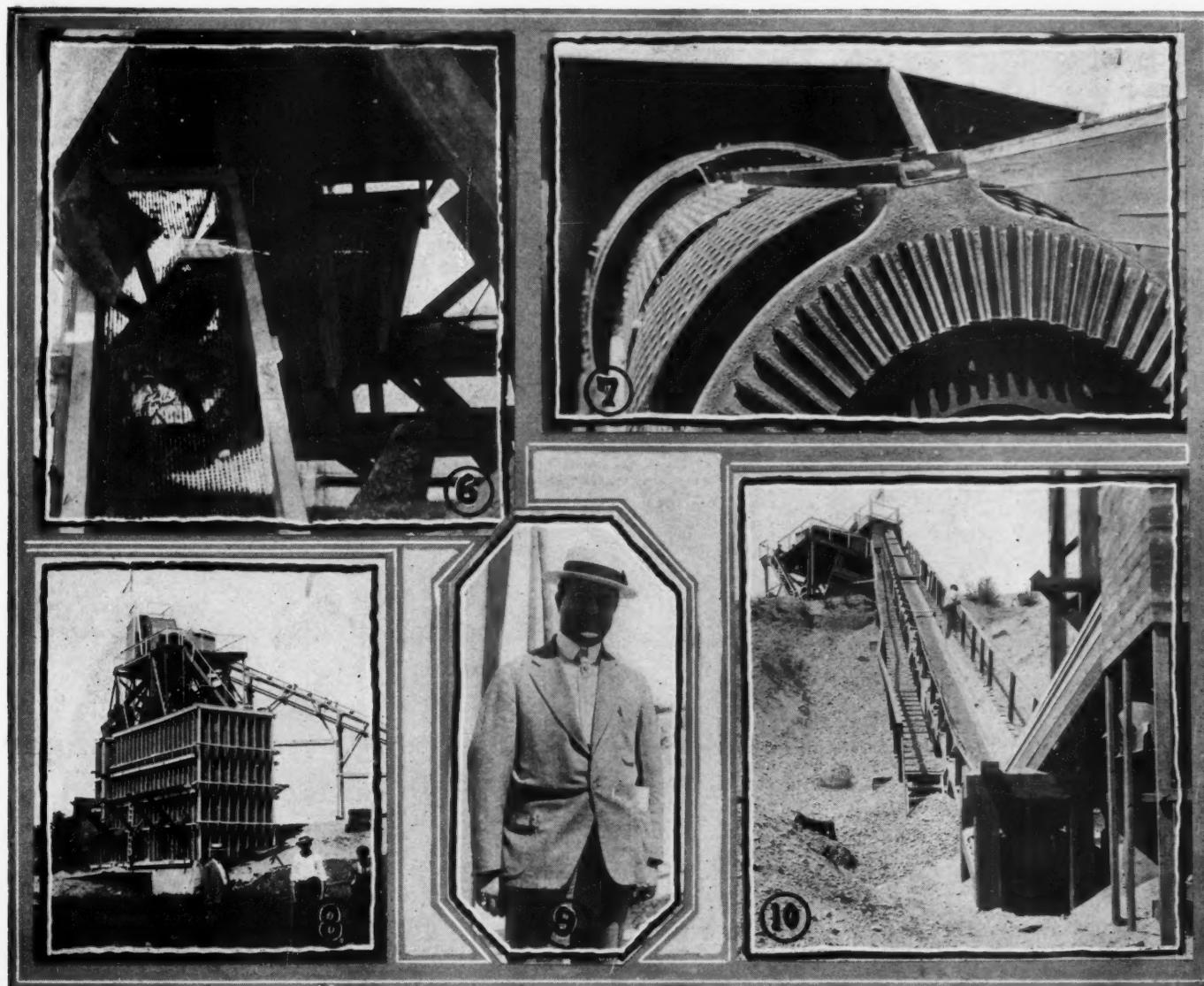
The bins provide room for four grades, which is the maximum of grades produced—mason sand, torpedo sand, roofing and No. 8 gravel.

Two cars can be loaded at a time. Two men of the five on the pay roll take care of the loading and of the spotting which is done by gravity.

The overburden is black dirt and does



(1) Rear end of digger, delivering to belt in lower left corner; motor in right-hand corner. (2) Field hopper receiving material from belt from digger and delivering to belt leading to grizzly and crusher. (3) Digger at rest. (4) Close-up of crusher. (5) Digger at work; note only two men required here. Switchboard controlling all machinery is close to the digger.



(6) Chutes below screens. (7) Screen in three sections, the farthest a double one. (8) From across the tracks; in foreground President Rubin, Salesmanager B. J. Tidrick and the general utility boy. (9) President Geo. A. Rubin. (10) Climbing up the 185 foot belt trestle.

not exceed 2 ft. at any place. For stripping the company uses team scrapers, the overburden being scraped to one side. The cost per yard of stripping has been running at about 30 cents. The deposit contains no foreign material whatever and runs about 60 per cent sand.

#### Operated by Electricity

The plant is operated by electricity furnished by the Rockford Interurban Line. One 15-horsepower motor runs the digger, two 25-horsepower motors run the crusher and main belt, one 10-horsepower motor runs the No. 2 belt, one 5-horsepower motor runs the field belt and there is also one 10-horsepower motor for the screen. All the machinery operations are controlled at one point at the digger.

A repair shop is maintained for small repairs. It contains a drill, forge and emery wheel.

#### Good Telephone Arrangement

A telephone arrangement has been installed giving the pit and offices at Rockford, Ill., direct connections and men can

be reached at any part of the pit.

The company is a member of the Sand & Gravel Producers' Association and has its main offices in the Ashton Building, Rockford, Ill. Geo. A. Rubin is president;

Louis Becker, secretary; Maxwell A. Schaff, treasurer, and B. J. Tidrick, sales manager. A Chicago office is also maintained at 3642 and 3646 S. Rockwell-st, and A. Rotstein is sales manager.



Acreage to be developed extends to trees in background at right



Dolomite, Utah's newest camp during construction period, thirty miles west of Salt Lake City

## New Lime and Stone Industry for Utah

**Vast Deposits of Both Dolomite and High Calcium Limestone Are Being Developed in Tooele County Near Salt Lake City**

IN the shadow of the Onequi range, near the abrupt point which glares defiantly across the sandy desert, some thirty miles west of Salt Lake City, there will be born to Utah within the next few weeks a new industry, the like of which exists in few other places in the United States—the manufacture of a really plastic dolomite lime hydrate.

Dolomite is the name of Utah's newest camp. And approximately three miles distant from Dolomite, in connection with another arm of the new industry and on the same railroad extension, has been established the sister camp of Flux. While at the point where the branch leaves the main line has been established the station of Ellerbeck.

### Easy Access to Salt Lake

To be more explicit regarding the location of the new industry, its site is approximately  $7\frac{1}{2}$  miles northwest of Grantsville and about 34 miles due west of Salt Lake. The station of Ellerbeck is approximately 4 miles west of Grant station on the Western Pacific. On the branch line, Flux is about  $3\frac{1}{2}$  miles from Ellerbeck, and Dolo-

By O. J. Grimes

mite is approximately 3 miles farther.

The parent of this new enterprise is the Utah Lime & Stone company, of which Dr. Will L. Ellerbeck and associates of Salt Lake are the moving spirits.

The holdings of the company embrace approximately 2000 acres, practically all patented ground. Included in this acreage, besides sites for the various plants contemplated and which may come as allied industries, are vast deposits of dolomite, high calcium limestone and beds of clay and silica believed to be the most extensive and among the highest grade in the state, if not in the West. On the property also is a big spring which the management of the company plans to develop sufficiently to supply water for all the needs of the industry and for the camps established and contemplated.

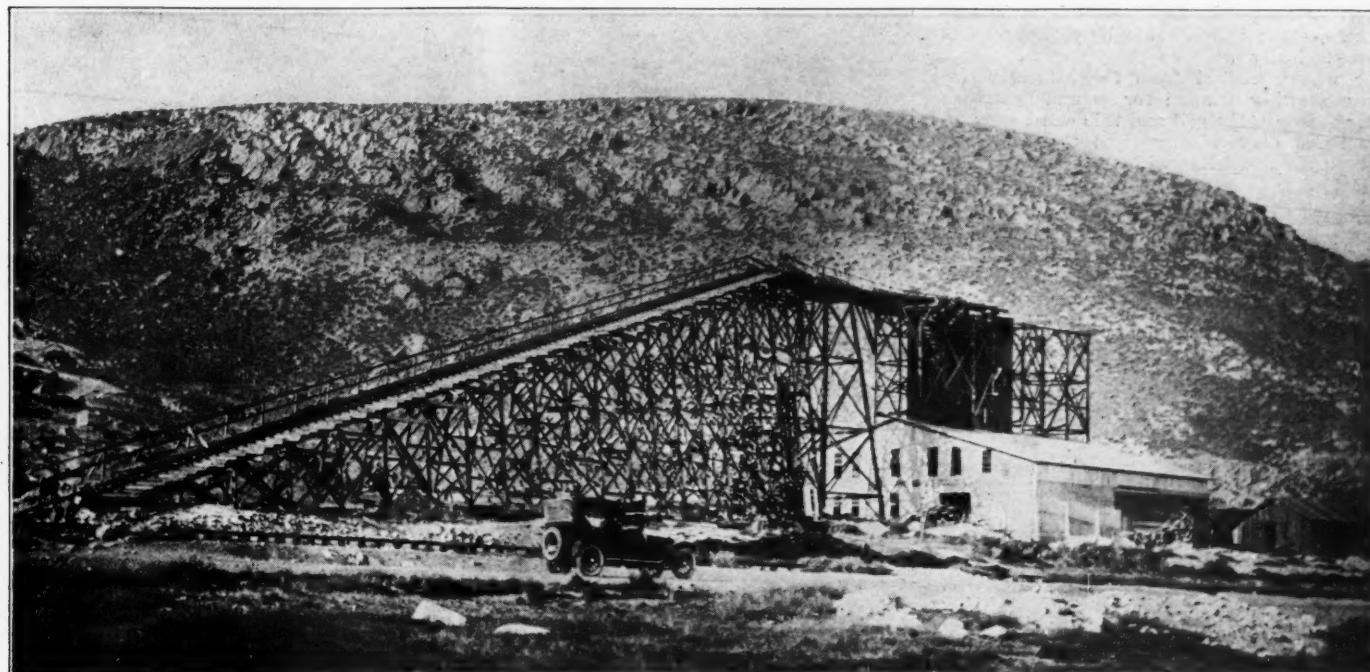
### Branch Line of Railroad

Fortunately, plans for development were well under way before the government assumed control of the railroads and the con-

struction of the branch line was well under way, in fact, practically completed, before the stringent orders relative to construction of new lines was issued. Anxious to assist in every way possible the development of industries along its line across the desert country the Western Pacific agreed to the construction of this branch as soon as it was demonstrated that ample tonnage was available and plans for development had assumed definite shape.

A crushing plant with an ultimate capacity of approximately 1000 tons daily already is contemplated at Flux station. At present an average of about 200 tons of pulverized lime rock are being sent daily to sugar factories and smelters. The first unit of the calcining plant at Dolomite is practically completed and is expected to be ready for operation within another week. This unit will have a capacity of 50 tons daily, and is to be increased as rapidly as possible in keeping with the demand for the product.

According to estimates made by Henry Fitzhugh, there are in the lime deposits 531,286,214 tons of dolomitic and high cal-



The calcining plant at Dolomite. Dolomite mountain in the background

cium limestone, and 55,368,108 tons in the clay and silica beds, ample in each instance to supply the western country for many decades to come.

#### Product of Unusual Purity

Extensive tests made of each deposit indicate that they are of unusual purity; in fact, of a quality equaled in but few instances in the United States. The dolomitic lime deposit is probably equaled only by the famous Niagara dolomites.

Dolomites of a comparatively pure grade are of frequent occurrence in California and in other parts of the mountain states, but they are lacking in certain physical characteristics necessary to the production of finishing lime of the desired plastic quality.

With reference to the character and extent of the deposits which are being opened up in Utah, excerpts from the report of E. W. Lazell, Ph. D., of Portland, Ore., one of the foremost lime experts in the country, are especially interesting. In his report Mr. Lazell says in part:

The limestone beds under examination are on the eastern side of the mountains and strike nearly north and south; they lean about 65 deg. to the west. The beds outcrop badly to a height of approximately 500 ft. above the desert level. The limestones have a bluish-gray color, and analyses examined by me indicate exceptional purity. Two kinds of limestone are exposed—dolomitic, or high magnesium, at the northern end of the deposit and high calcium at the southern end.

The rocks are microcrystalline; in fact, the physical character of the stone resembles closely the famous Niagara dolomites, extensively used in the manufacture of dolomitic hydrate in northern Ohio, and the product of which is distributed throughout the United States. From my experience with dolomites, I am satisfied that this material, when burned, will give a lime of

exceptional quality and one suitable for the manufacture of plastic hydrate for building purposes and chemical purposes in connection with the sulphite pulp trade.

#### Lime Has Good Commercial Properties

I am confirmed in this statement by the fact that about 50 tons of lime have been burned from this material at the plant of the International Lime Co., Sumas, Wash., and that both the stone and the lime have been examined by me. The resulting dolomitic lime was of exceptional purity and burned with great ease. The stone did not spall or break down under the influence of heat. This indicates a large kiln output and economical burning. The burned lime was solid and hard and would stand transportation without breaking down.

The hydrate prepared from this lime in commercial quantities at the plant of the International Lime Co. proved a plastic hydrate of a quality equal to the famous hydrates manufactured in northern Ohio. This class of hydrate is used throughout the United States for finishing. To my knowledge, no dolomitic hydrates are manufactured at present west of the Mississippi river, and Ohio hydrate is at present being sold on the west coast for finishing purposes, notwithstanding the excessive freight rate.

Samples were taken at right angles to the strike of the vein across the two dolomite deposits. One sample represents approximately 1200 ft. at right angles to the vein and the other sample about 700 ft. The chemical character of the lime has been demonstrated by the material burned at the plant of the International Lime company.

#### Flux to South of Dolomitic Deposits

That the product is particularly suited for the use of the chemical trade is indicated by a test made at the plant of the Crown Willamette Paper Co., West Lynn, Ore. I was present all three days when the product was being used in the preparation of acid liquors.

The extent of the dolomite deposits was so great, as in both deposits more than 2000 ft. horizontal to the strata is exposed, and the height is so great that it was un-

necessary to estimate the tonnage. There is no question but that sufficient tonnage is available to warrant a very extensive development. There are easily more than 30,000,000 tons of dolomitic lime in sight and this is sufficient to manufacture 15,000,000 tons of burned lime, or ample to insure the operation of a plant with a 100-ton daily capacity for more than 500 years.

The flux rock or high calcium limestones lie somewhat to the south and east of the dolomite and resemble it to a great extent in physical characteristics. The stone is hard, dense, bluish gray rock, closely grained, and, in my opinion, would burn easily. The physical character indicates that the rock would not fire-spall, nor break down under the heat of burning. As the chemical character of this high calcium stone has been extensively investigated by competent, disinterested engineers, no samples were taken by me. An examination of the chemical reports made indicate, that the high calcium rock is suitable for use as flux in the smelter trade, also as lime rock for making lime at sugar plants, and for the manufacture of high-grade high calcium building lime.

In my opinion the deposit of dolomite is the best I have seen west of the Mississippi river. The accessibility of the deposit is unusual and the material can be quarried very economically. The high calcium deposits are very extensive and the purity is good; in fact, the analyses indicate that the rock is of better quality than is being used at present by the smelters in this vicinity.

Besides the lime products there is present on the property an extensive deposit of shale and clays suitable for the manufacture of a variety of clay products. Further, the high calcium limestone is suitable for the manufacture of Portland cement, when used in conjunction with the proper clay base.

While I have recommended only the development of the lime and flux rock end of the business for the present, there are numerous other commercial materials which could be manufactured economically, such as Portland cement and dead burned dolomite for the steel trade. There also are

further magnesia products and liquid carbon dioxide which could be manufactured economically and which otherwise would be waste product from the kilns. There is a growing demand for ground limestone for use upon the soil and this can be manufactured economically from the fine rock or quarry spalls which otherwise are wasted.

#### Analyzed Samples of Rock

From the various analyses made by Mr. Lazell in connection with his investigations the following two have been selected as representative, one of the raw rock and one of the burned lime from the dolomite deposit. The analysis of the raw rock showed the following content: Silica, 0.46 per cent; alumina and iron oxide, 1 per cent; lime, 31.08 per cent; magnesia, 21.66 per cent; loss on ignition, 45.8 per cent. The analysis of the burned lime showed silica, 0.22 per cent; alumina and iron oxide, 0.32 per cent; lime, 57.06 per cent; magnesia, 39.98 per cent; loss on ignition, 2.52 per cent. The analysis of a sample from the high calcium ledge showed 54.11 per cent lime and 2.35 per cent insoluble. Analyses of more than fifty cars recently supplied to sugar factories show an average insoluble content of but 1.3 per cent.

What is believed to indicate the general makeup of the dolomite deposit is represented in an average analysis of twenty-four samples made by Dr. W. C. Ebaugh, formerly with the University of Utah and now consulting chemist for the United States Smelting Co. The average of the twenty-four samples showed 0.4 per cent insoluble, 0.82 per cent alumina and iron oxide, 30.65 per cent lime and 22 per cent magnesia.

Another resource controlled by the new industry which is worthy of some attention is a big quarry of rock which has been demonstrated to be of more than ordinary merit for road building purposes. From this quarry was furnished the rip rap for the construction of the Western Pacific



Flux quarry at Flux, sister camp of Dolomite, three miles distant

across Great Salt Lake. Hundreds of thousands of tons of the rock were used for this purpose and more is being used by the railroad every year for additional ballasting and repair work. A spur track was built several years ago to serve the quarry.

#### Rock Satisfactory for Road Building

Investigations as to the merits of the rock for road building purposes were made by Professor E. H. Beckstrand of the University of Utah and the result of the tests was highly satisfactory.

The importance of and the possibilities in connection with the development of the dolomite deposit are suggested in the report prepared by Mr. Lazell, because of the rarity of a deposit of such extent and purity. Reference to the possibilities in connection with the development of the high calcium lime deposit, however, is limited.

In view of this it is believed that the development of the deposit at Flux station will furnish a mason's lime which will find

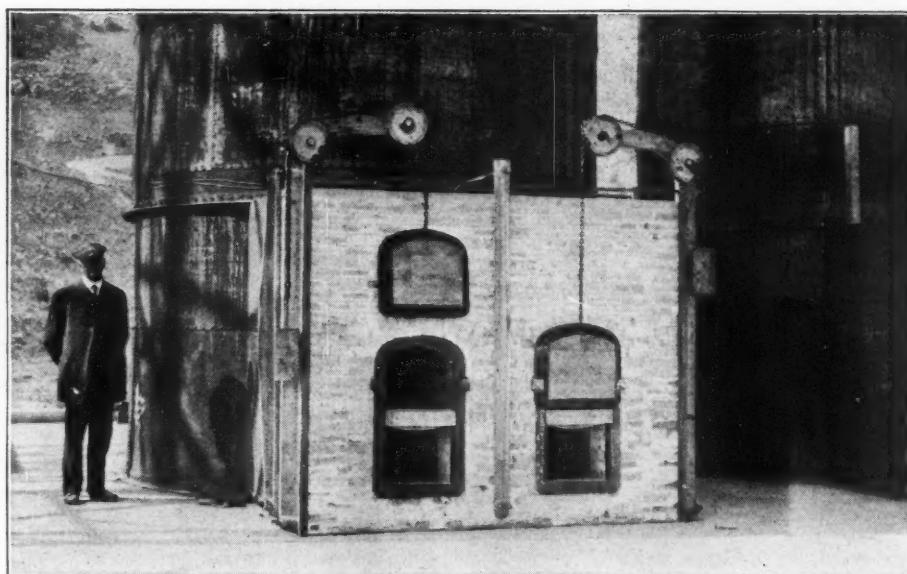
a wide and ready market in the western country. It is planned to market lump lime in bulk steadily. But this grade of rock is adapted to other uses than the manufacture of mason's lime, principally as flux for smelters and in the refining of sugar. In tests made by several local industries the results indicate that the quality is better than that of any product in common use in the region. It carries almost the theoretical and maximum in lime and the minimum in silica and magnesia. Its importance in this connection is suggested by the fact that the company already is producing an average of about 200 tons daily for fluxing and sugar refining purposes. The development has been undertaken on such a scale as to provide a certain and steady supply, a feature highly desirable to the industries which create the market for the product.

Estimates as to the demand for lime flux in the immediate territory indicate that the smelters alone consume approximately 750 tons daily on an average. While the demand for high calcium lime in connection with sugar refining is more widely distributed, the amount consumed is less because of the fact that the sugar factories operate only a few months out of each year.

At present a large portion of the lime rock used for fluxing purposes is obtained from the quarries in the vicinity of Topliff, on the old branch line which once served the camp of Mereur. Several small quarries have been opened up to furnish lime rock for the sugar refineries but the production, as a rule, is of a sporadic character. The principal source of supply in the immediate vicinity of Salt Lake comes largely from quarries around Santaquin.

#### Quality of Clay Exceptional

Details concerning the development of the big deposits of clay and silica have not been worked out as yet. Experiments in



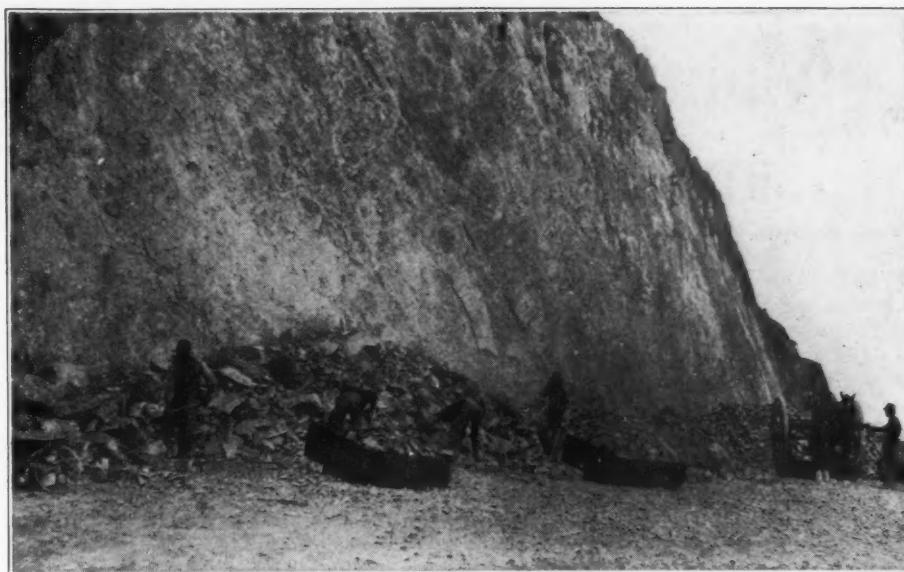
Kiln No. 1, part of first unit of calcining plant at Dolomite

dicate that the quality of the clays is exceptional in connection with the manufacture of sewer pipe, paving brick, face brick, terra cotta, boiler brick and tapestry brick.

Some idea of the immensity and importance of the development undertaken is suggested in the fact that the acquisition of the lands and improvements already made and under way represent an expenditure of approximately a quarter of a million dollars. This seems especially important in view of the fact that the enterprise is only in its infancy, developed only to the extent of being in a position of caring for the demands for flux and lime rock for sugar refining and scarcely more than local needs for dolomitic hydrate and high-grade mason's lime.

Already the camps established furnish employment for approximately forty men daily, and when the calcining plant is in operation the force will be increased approximately 40 per cent. As the market is broadened, the capacity of the calcining plant will be increased to care for the demand, and if the development progresses on the scale anticipated the camps will assume considerable importance within another year or two.

While the market for mason's lime probably will be confined largely to the intermountain states—Utah, Idaho, Nevada and Montana—it is possible that the field may be extended to cover parts of California, and even Arizona and New Mexico. The market for the dolomitic lime hydrate is much greater, in view of the fact that the only product of equal quality is produced in northern Ohio, and its use in western states necessitates a transcontinental haul. Under such conditions it is assumed that the market for Utah dolomitic hydrate will include practically the entire territory west of the Missouri river, and a large part of western Canada. Basing the computation only on the territory including the intermountain region, and the Pacific coast states and British Columbia, it is estimated that there will be a ready market for approximately 50,000 tons of dolomitic hydrate annually. This one product alone, it is estimated, should bring to the state each year approximately \$500,000, practically all of



One of the high-calcium stone quarries at Dolomite

which is now going to eastern industries.

#### Conditions Favor Rapid Development

There are many features in favor of rapid and extensive development of the new industry. The deposits cover materials used extensively in the production of many widely used and necessary products. They are situated at a point central to the entire western country, and have ample railroad transportation to all western commercial centers, and to local industries which create a local market. The cost of mining or quarrying is reduced to a minimum because the deposits are already exposed and entirely free of overburden.

The possibilities for the development of an industry of importance to the community and the state was realized by Dr. Ellerbeck about ten years ago, when he first learned of the big limestone and clay deposits near Grantsville. No sooner had the discovery been made than he began to formulate plans looking to the development of these unusual resources, but until within the last two years his efforts were confined largely to work incident to procuring patent to the property. When the Western Pacific built its line he was given some

financial assistance through the purchase by that company of rip-rap necessary to the construction of the grade across the southern end of Great Salt Lake.

Having acquired title to the holdings, he employed experts from various sections of the country to pass upon the merits of the dolomite and high calcium lime deposits, and extensive tests were made, all of which indicated that ample resources were available to justify the establishment of the proposed enterprise. Also he made an intensive study of market conditions throughout the western country in so far as the products to be manufactured were concerned, and the result of these investigations, too, were highly satisfactory.

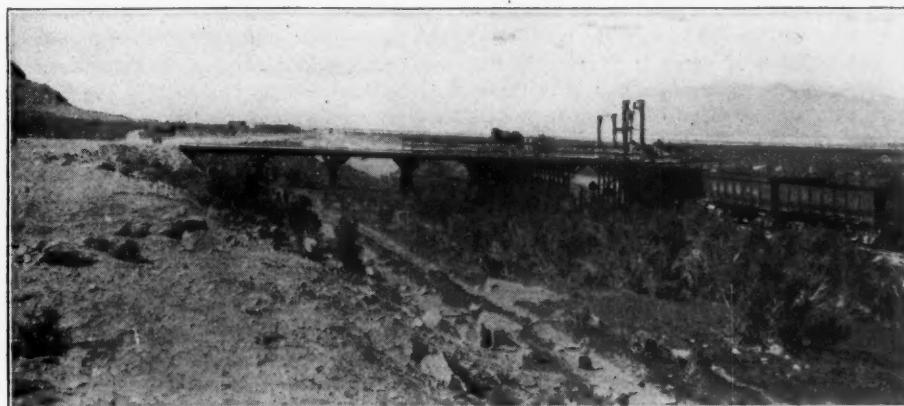
The stone quarry was operated about ten years ago for the benefit of the Western Pacific, but the other deposits lay untouched, except for experimental work, until less than a year ago. The possibilities for the development of a new industry appealed to the management of the Western Pacific sufficiently to bring about the construction of a branch line to the property.

Last October Dr. Ellerbeck and his associates whipped their plans into workable shape and laid out the site for the crusher at Flux and the calcine plant at Dolomite. The branch line was completed a few months later. Then the necessary quarry equipment was erected and the construction of the calcining kilns was begun.

#### The Picture on the Cover

THE COVER PICTURE is an unusual quarry scene, a tunnel entrance to an enclosed quarry where operations are carried on shut off from the view of the world, belonging to Berkley Spring Glass Sand Co. quarries at Berkley Springs, W. Va.

In beginning operations a tunnel is driven into the side of a ridge 200 ft. or more; then a shaft is sunk from the top of the ridge to the tunnel. See Sept. 25th issue.



Loading high-calcium stone for sugar refining

# Manufacturers' Views of Agricultural Limestone Business

Opposite Ideas on Desirable Fineness of Material

**EDITOR ROCK PRODUCTS:** We note that the National Agricultural Pulverized Limestone Association has set a standard for fineness of 100 per cent through a 10-mesh sieve and 60 per cent through a 100-mesh sieve.

In our opinion, this is a step in the right direction. We feel certain that after this ruling has been in force for a short time, producers of agricultural limestone will see the benefits resulting from being in position to furnish material ground to a high degree of fineness. A large number of manufacturers of agricultural limestone are in position at this time to furnish limestone ground to a fineness of at least 60 per cent through a 100-mesh sieve. In fact, some producers are actually shipping limestone ground to a fineness of 90 per cent through a 100-mesh sieve and find that it is commercially possible to furnish a product of this kind.

#### Coarse Material Unsatisfactory

We know of many instances where coarsely granular limestone had been marketed, and the results obtained when using this coarse material were far from satisfactory. When, however, the farmers changed over to using a material ground to a fineness of at least 90 per cent through a 100-mesh sieve, the improvement was so apparent that they cannot now be induced to broadcast over their fields any agricultural limestone pulverized to a fineness of less than 90 per cent through a 100-mesh sieve.

As a case in point, we might mention the tobacco growers in the Connecticut Valley. For several years the tobacco growers in the Connecticut section had been using limestone pulverized to a fineness of 95 per cent through a 10-mesh sieve.

In the process of manufacture, irrespective of what equipment is installed, the product resulting from a desire to obtain 10-mesh product, will necessarily contain a certain percentage of 20 mesh, 40 mesh, 50 mesh, 60 mesh, 80 mesh and 100 mesh product, but instead of grinding to a fineness of 95 per cent through a 10 mesh, they should have adjusted their machines to deliver a product having a fineness of at least 90 per cent through a 100 mesh.

#### Farmers Want Finely Ground Stone

At the present time, the farmers in the district mentioned above, will not use any material pulverized to a fineness of less than 90 per cent through a 100-mesh sieve, and the manufacturers of agricultural limestone catering to that district are in

position to furnish a product having a fineness of at least 95 per cent through a 100-mesh sieve.

The virtues of fine grinding of agricultural limestone are not limited only to the Connecticut district. We know that the various agricultural experimental stations of the states of New York, Pennsylvania and Rhode Island recommend that the limestone be finely ground, and that it contain at least 60 per cent of 100-mesh product.

#### Farmers Want Quick Response

The arguments advanced by the producers of coarsely granular agricultural limestone are that the benefits to be derived from the use of this coarsely granular material are spread over a period of years. The farmer is interested in what he can

Too much cannot be said in favor of the use of lime in some form on acid soils, which means three-quarters of the State of Wisconsin. Its most marked effect is on alfalfa or clover, but other crops are also greatly benefited and the practice of making an application of lime to each field every four to six years will unquestionably increase the yield of most Wisconsin farms. Hundreds of farmers are now using lime where one used it ten years ago. Its use should become very general. —Prof. A. R. Whitson, University of Wisconsin.

produce this year. He must finance himself accordingly, and the results of the present year's crop determine whether he meets his bills or is carried over by some accommodating friends until the following year. In order that the current year's crop may be a success and return him maximum value for his labor and efforts, it is to his interest to use material in the soil from which he will derive immediate benefit.

The rotation of crops is thoroughly understood by agriculturists, and it is therefore to their interest to arrange their fertilizer program so that the crop in the ground will be benefited by the fertilizing element broadcasted at the time.

#### Should Revise Rule

We are strongly in favor of the rulings and feel certain that after the benefits of finely ground limestone have made themselves apparent, the Association will not be satisfied with a product having a fineness of 60 per cent through a 100-mesh sieve, but that they will revise their specifications, and call for a product having a

fineness of not less than 75 per cent through a 100-mesh sieve.

In fact, we are firm believers in producing limestone ground to a fineness of at least 90 per cent through a 100-mesh sieve. This can be produced commercially without the use of any outside accessory equipment and inasmuch as a large number of plants are equipped at this time, with equipment that enables them to produce agricultural limestone ground to this degree of fineness, we see no reason why the fineness to which agricultural limestone should be ground should not be at least 60 per cent through a 100-mesh sieve as determined by the Association.

A. P. Hachmann,  
Fullerton, Pa., June 15.

**EDITOR ROCK PRODUCTS:** As to the economy of this new standard, we hardly feel that this is a matter for the manufacturers of limestone grinding equipment to decide. It would really appear to us that the decision rests with the agricultural and soil experts, and that they should select or determine, after consultation with the producers of agricultural ground limestone, the particular degree of fineness that will give the greatest percentage of available lime at the lowest cost.

Of course the main object of the agricultural authorities is to increase the use of agricultural limestone. This is also the object, for a different reason, of course, of the producers of agricultural limestone and of the manufacturers of limestone grinding equipment.

We do not feel that the standard selected by the National Agricultural Pulverized Limestone Association is a step in this direction, for we believe that the fineness selected as their standard will result in a higher cost of limestone to the farmer. The cost of production of agricultural limestone increases with the degree of fineness, not at a direct rate, but at a much greater rate than the degrees of fineness secured.

For our part we feel that a much wider use of agricultural limestone could be secured by the sale of a low cost product of moderate degree of fineness, but which nevertheless would contain a large percentage of material immediately available, and it is along this line that we have worked in the development of our portable farm outfits. The small percentage of over-size material contained in such a product is moreover not a loss, but becomes available to the soil over a longer period of time.

W. J. Armstrong,  
Columbus, Ohio, July 16.

# Labor Saving in Limestone Quarrying

## Results of U. S. Bureau of Mines Investigation of the Limestone Flux Industry

THE participation of the United States in the present world conflict has led the Bureau of Mines to concentrate its activities on such phases of the mining and quarrying industries as will best promote the nation's military effectiveness. The labor situation is becoming more and more acute, and this article is designed to assist in some measure in relieving the labor shortage in those branches of the limestone quarrying industry that are indispensable to the military program.

The nation's normal industries have suffered considerably on account of labor shortage occasioned by the mobilization of men to form a great army and navy, and by the development of special industries to supply their needs. The quarry industries are no exception to this rule, for many men, both skilled and unskilled, have been taken from these industries by enlistment or by the selective draft. In addition to losses through ordinary enlistments, the formation of a regiment (the 28th Engineers) consisting entirely of skilled quarrymen, has further reduced the available labor supply in this most necessary class of quarry workmen.

The unprecedented demand for iron and steel occasioned by the war has developed maximum activity in the iron smelters of the United States. As a limestone flux is required for smelting siliceous iron ores, quarrying for the production of blast-furnace flux is an industry essential to successful prosecution of the war. The heavy demand for fluxing limestone combined with an increasing difficulty in obtaining sufficient quarry labor, has resulted in a condition that demands relief. Hence, the time is opportune for the Bureau of Mines to disseminate whatever information it may possess that will in any way assist quarrymen in their efforts to produce a maximum of rock with a minimum of labor. The purpose of this pamphlet is, therefore, to direct the attention of quarrying men to the most successful and efficient labor-saving methods and machines. Although many such devices are now in successful operation, there are few companies that cannot in some way modify their methods or equipment so as to conserve labor.

The author of this article has visited a number of fluxing limestone quarries for the express purpose of observing labor-saving devices, and, in connection with various quarry studies during the past four years, has obtained information relating to this subject. Consideration is given only to those methods and types of equipment that have been tried and approved by quarry operators.

By Oliver Bowles

### Quarrying with Adequate Labor Supply

The demand for labor in limestone quarries has in past years been adequately met in most localities, especially in the Southern states. In fact, labor has in many instances been more readily obtainable than capital. This condition is reflected in the quarry equipment, for where capital has been more difficult to obtain than labor the tendency has been to employ only the most necessary mechanical equipment, and wherever possible to conduct operations by simple hand methods.

### Introduction of Mechanical Equipment

The tendency to employ hand labor rather than machines, has, however, certain disadvantages, and of late years especially in large quarries, hand methods have been largely superseded by mechanical means. This substitution of method was occasioned in most cases, not by any pronounced shortage of labor, but because the mechanical methods were quicker, cheaper, and promoted a rapid and material increase in production.

### Objections to Its Introduction

When labor is cheap and plentiful the advantages of mechanical equipment, particularly in small quarries, are questioned by many operators. In large quarries the advantages of mechanical equipment are generally recognized. The adoption of such equipment has, however, been slow in many places. This is due to various causes, the chief of which are conservatism of operators, lack of information on modern equipment, and lack of capital.

### An Essential Quarry Industry

While it is a difficult matter to properly judge the relative military importance of various industries, it is comparatively easy to select certain industries that contribute definitely and materially to the nation's military strength. Various branches of the limestone quarrying industry fall in the latter class. Many quarries produce stone for concrete aggregate, for cement or lime, or for road material, all of which are more or less directly concerned in the military program.

There is one branch of quarrying, however, that is directly associated with an industry of vast military importance. The heavy demand for iron and steel occasioned by the war has kept the iron smelters of the United States employed at maximum capacity. The increased activity in smelt-

ing is reflected in a corresponding increase in the demand for fluxing limestone. According to statistics compiled by the United States Geological Survey, the production of blast-furnace flux in the United States during 1916 amounted to 23,603,508 tons, valued at \$13,936,882, an increase of 24 per cent in volume and 44 per cent in value over that for 1915, and the increase during 1917 has evidently continued at about the same rate. During August, 1918, the statement was made in a technical journal that the production of fluxing limestone had then reached 120,000 tons daily. The increased demand for flux is occasioned partly by the increase in iron production and partly by a wider use of siliceous ores that require a high proportion of flux. As adequate supply of fluxing limestone is absolutely necessary in iron smelting, limestone quarrying ranks among the most essential industries.

### Safeguarding an Essential Industry

It is obvious that for industries of such importance every precaution should be taken to insure requisite activity. A pronounced shortage of limestone would paralyze the iron-smelting industry no less surely than a shortage of fuel or of ore. It is wise, therefore, in this critical period to consider carefully any circumstances that may tend to materially curtail production, and to take whatever steps may seem advisable to overcome all obstacles.

### Recent Heavy Demands on Labor

During 1917 and 1918, a new factor has made its influence felt in all the industries of the nation. The creation of a great army and navy, the development of industries to supply them with food, clothing, munitions and equipment, the necessity for supplying our allies with war material, and the building of an immense merchant fleet, have combined to greatly increase the demands upon the labor supply of the country, and the situation will probably become more and more acute as the military strength of the country develops. It is apparent, therefore, that labor shortage is one of the serious problems if not the most serious problem that confronts limestone-quarry operators at the present time.

### The Demand for Labor-Saving Devices

The demand for a greatly increased production of fluxing limestone, combined with a labor shortage, creates an acute situation that demands relief. One obvious means of relief is to substitute mechanical equipment for labor. Fortunately, many such substitutes are not only known but have passed the experimental stage, and are now in successful operation in many places. Labor may also be conserved by simpli-

\*War Minerals Investigation, Series No. 1, Department of the Interior, Bureau of Mines.

cation of method, by efficient blasting, and in various other ways.

#### Labor-Saving Devices Defined

Labor-saving devices include all quarry equipment and quarry methods the employment of which tends to reduce the labor required for a given output. Such saving of labor is accomplished by mechanical devices performing work formerly done with hand tools, by equipment that simplifies quarry methods and eliminates all unnecessary operations, by methods or plans that utilize all natural conditions to best advantage, or by such conduct of quarry work that time may not be wasted in idleness or in unprofitable employment.

#### Types of Labor-Saving Devices

Many labor-saving devices are in the form of mechanical equipment. It has commonly been found that machines controlled by a few men can do as much work as a large number of men can perform when unassisted by machines.

Other labor-saving devices consist in the use of simple and direct quarry methods. Quarry operations should be planned so as to avoid all methods that place an unnecessary burden on labor. Thus excessive re-handling of material, complexity in transportation systems, and loss of time through conflict of various operations should be avoided. Where this can be accomplished by modification of method, involving no heavy expense in the purchase of new equipment it is a type of labor saving that demands special encouragement.

#### Difficulties Encountered in Purchase of New Equipment

Objections to the purchase of new mechanical equipment at this time, are—The shortage of supply owing to the demand on machine shops to manufacture war material, the heavy demand for iron and steel, and the high cost of machinery. Many operators, however, are fully convinced that certain types of quarry machinery offer sufficient advantages to encourage their purchase even under present unfavorable conditions.

#### Discussion of Labor-Saving Devices

Having pointed out the need of labor-saving devices imposed upon quarrymen by the extraordinary conditions of the war, the following pages are devoted to a consideration of specific types of equipment that save labor, and to a discussion of quarry conditions and methods that favor economy of labor.

Many of the methods and types of equipment discussed in the following pages are applicable only to quarries of considerable size; for operators having limited capital would scarcely be justified in purchasing expensive equipment. However, a small and simplified modification of the more elaborate equipment designed for large quarries could probably be substituted to advantage for hand methods in many small quarries.

The method of opening a quarry may

have a direct bearing on the economy of labor in developing it. The depth of stripping to be removed should be carefully noted and an effort made to develop the quarry in a direction that requires a minimum of stripping.

All rock structures should be carefully considered, for their presence may greatly influence the ease of rock removal. In one New York locality, for example, the limestone beds dip about 40, and the quarry was opened in such a manner that development took place down the dip. As a consequence, accumulations of water at the working face after every heavy rain caused a temporary suspension of operations with consequent loss of labor. Had the quarry been opened in such a manner that development proceeded in the opposite direction, the water would have drained away, and no accumulation at the face would have been possible.

Planning a quarry so as to utilize rock structures to best advantage may greatly economize labor. Where limestone lies in approximately horizontal beds the utilization of an open bed plane for the quarry floor, or a bench floor, not only makes blasting easier, but the smooth surface that results requires little or no grading or ballast for tracks, and track laying may be accomplished with minimum labor. A smooth floor also facilitates rock loading.

The quarry, crusher, and storage bin should be so situated that transportation may be simple and direct, and the force of gravity should be utilized wherever possible. This matter is considered in greater detail under the heading "Transportation."

#### Stripping: Necessity for Separation of Overburden

Limestone quarried for blast-furnace flux must be as free as possible from siliceous impurities. Commonly the permissible silica content is limited to two per cent. As large a proportion as possible of the quarry overburden, consisting of clay, sand, gravel, boulders, or mixtures of these materials, all containing a large percentage of silica must, therefore, be separated from the rock.

#### Factors Governing Method of Removal

The removal of overburden is accomplished in many different ways, the variations in method depending greatly on quarry conditions. The amount of overburden to be removed may vary from a few inches to 25 or 30 ft. Obviously methods employed for the removal of a few inches of foreign material would not be applicable for the removal of a depth of several feet. Stripping methods are influenced by the nature and depth of the overburden, and also by the nature of the rock surface, by the convenience of the dumping ground, by water supply and drainage, and by the amount of capital available for stripping equipment.

#### Overburden Shot Down with Rock

Operators of quarries in rock deposits with overburden limited to a few inches in

thickness may be justified in shooting down the overburden with the rock, and in separating rock and waste material by a subsequent operation. Where seams or erosion cavities are filled with clay, sand, or gravel, the difficulty of removing the waste material before rock blasting may render it necessary to blast rock and waste material down together, and to separate the siliceous material from the good limestone at a later time. Such subsequent separation may be accomplished by either of two methods.

According to the first method the rock fragments are loaded into cars by hand, and accumulations of debris are loaded in the same way. For small quarries such procedure may be justified, but under conditions of labor shortage the method is too slow and laborious to be recommended for quarries of any considerable size.

The second method is in common use in the larger quarries. The rock fragments together with waste material are loaded with a steam shovel, a method that is economical of labor, and the separation of good rock and waste is accomplished by screening or by washing in conjunction with screening. From the standpoint of labor saving, this method is greatly to be preferred. One objection to the method is the waste that results from the finer rock fragments passing through the screens with the debris, though this waste may be partly overcome by screening the rock to various sizes and discarding only the finest grade of material.

#### Removal of Overburden Prior to Rock Quarrying

While shooting down rock and overburden together, and subsequently separating them by sorting, screening, or washing, may, as stated above, be justified under certain circumstances, the removal of overburden prior to rock blasting offers certain definite advantages.

In their natural occurrence serviceable rock and waste material are as a rule distinct, and are separated by a well-defined boundary. An exception to this rule is the occurrence of clay seams or pockets in the rock ledge. Where any considerable amount of debris is originally unmixed with the rock, it is obviously a poor policy to mix rock and waste by blasting them down together when their subsequent separation is demanded. It involves unnecessary handling of waste, and in rainy seasons the presence of sticky clay with rock impedes operations and renders separation difficult. A better plan is to remove overburden as completely as possible before blasting the rock ledge.

Various methods in common use for the removal of stripping have been described in other publications of the Bureau of Mines.\* The purpose of the present pub-

\* Bowles, Oliver.—Sandstone quarrying in the United States, Bureau of Mines Bulletin 126, 1917, pp. 26-33, and Rock quarrying for cement manufacture, Bureau of Mines Bulletin 160, pp. 37-42.

lication is to give special consideration to their respective labor requirements.

#### Labor Requirements of Various Stripping Methods

Loading waste material into dump carts or cars with hand tools is doubtless recognized by most quarrymen as involving the most prodigal use of labor, per ton of material moved, of any method in common use. Fortunately, it is not commonly employed except in very small quarries.

Where the overburden rests on a reasonably smooth rock surface, and the dumping ground is near by, the employment of teams and scrapers results in a pronounced saving of labor over hand methods. Where the waste must be moved a considerable distance a method has been noted whereby the scraper loads are dumped through an opening into wagons on a depressed roadway, the soil being thus handled in two operations. Under such circumstances wheel scrapers are to be preferred for thus a single operation will suffice, and such simplification reduces the labor requirement.

A drag-line scraper alone has been used effectively where conditions are favorable, and a drag-line scraper used in conjunction with dump cars as described in Bulletin 160<sup>†</sup> may be used to advantage. By either method the heaviest burden of the work is accomplished by machinery, and the labor requirement is not high.

The most popular stripping equipment for large quarries is the steam shovel. It requires a small gang of men, and when properly handled and well supplied with cars can load a great mass of material in a day. Efficient service depends on strong mechanical construction, adequate care, and operation by a skilled runner. Where inefficiency in steam shovel operation is in evidence it usually results from inadequate car service for removal of loaded material rather than from improper handling of the steam shovel itself. However, this subject is considered in connection with transportation problems.

While the first cost of a steam shovel is high, with proper care the cost of maintenance is not excessive. Where the rock surface is fairly uniform and level the steam shovel is probably the best equipment for loading any considerable thickness of overburden.

A stripping conveyor to be used in conjunction with a steam shovel is illustrated and described in a former publication.\* Such equipment cannot be generally employed for it is applicable only to quarries where the overburden may be conveniently disposed in the pit formed by removal of the good rock.

With adequate water supply, proper drainage, and sufficient waste-disposal area, hydraulic stripping is probably the most economical of labor of all methods in common use. With two men at the pumping

station and two to handle the nozzle, a great mass of debris may be washed down in a single day. The rate of removal depends on the size of the nozzle, the available water pressure, and the consistency of the soil. The rate of progress may be retarded if the overburden is hard, for it may be necessary to bore it with a soil auger and blast with powder. The presence of numerous boulders may also render hydraulic stripping difficult.

As labor is the chief cost item in stripping, the cost per cubic yard is a fair indication of the relative labor requirements of various processes. The following figures representing minimum costs noted by the writer during field investigations may be of interest in this connection: Hand shovel and dump cart method, 30 cents per cubic yard; steam shovel and cars hauled by dinkey engine, 16 cents; steam shovel and stripping conveyor referred to above, 3 cents; drag-line scraper (to loading platform only), 3 cents; hydraulic stripping, 3 cents.

(To be continued.)

#### Large Phosphorus Plant at Fairmont, W. Va.

A REPORT from Fairmont, W. Va., says that work will soon begin on the construction of a large phosphorus manufacturing plant near there, and that it will be

owned and operated by the Government. It will be electrically operated by power supplied from the new Riverside station of the Monongahela Valley Traction Co. It is further stated that Capt. W. W. Huff and Lieut. A. D. McClellan are representing the Government at Fairmont and that they will remain there until the erection of the plant is completed.

#### Makes 10 Tons of Potash to 7½ Tons of Coal

ALLIANCE, Neb.—The small potash plant of the Sunnyside Potash Co., recently erected on the Phelan ranch lakes, ten miles southeast of Alliance, Neb., by M. F. Crossette and George K. Kimball, two mining engineers, has been in operation for several days and, according to Mr. Kimball, is proving a decided success.

A rotary oil dryer is to be installed at once as the operation of the dryer has shown that the tower reduces enough brine in five hours to operate the pan dryer now being used for 48 hours. The tower reduces at the rate of nearly ten tons of potash salts per 24 hour day, using only one and one-half tons of coal for two tons of potash.

The salts produced at the plant runs high in potash, averaging 29.27 K<sub>2</sub>O. This plant is reported as having been sold to the Home Potash Co.

## Pittsburgh Man Claims New Method of Making Potash

#### U. S. Judge Gives J. D. Rhodes Authority to Experiment at Plant of Castalia Portland Cement Co.

PITTSBURGH, Pa.—James D. Rhodes, a Pittsburgh manufacturer, says he has discovered an original process by which he can extract potash from the dust from cement during manufacture in the kilns, and he was ordered by Judge Charles P. Orr in the United States District Court to enter into an agreement with the Castalia Portland Cement Company of Castalia, O., to experiment with the process with a view of aiding the government to obtain potash for munitions and fertilizer.

#### Receiver Appears in Court

George W. Hackett, receiver for the Castalia Portland Cement Co., had appeared before Judge Orr and asked permission to make an agreement with Mr. Rhodes to carry out the project. He said he had made an investigation of Mr. Rhodes' method and was convinced there was much merit in it.

Judge Orr listened with interest to the plan and at the conclusion of the reading of Mr. Hackett's petition said the idea was a good one, and signed an order permitting the transaction.

It is understood Mr. Rhodes, at his own expense, will erect a large experimental plant adjoining the plant at Castalia and will experiment with the process 120 days. If the process is found to be of commercial value a \$100,000 plant will be erected and the process may be adopted in every cement-producing plant in the United States.

#### Has Been Experimenting

Mr. Rhodes declined to go into details concerning the process. He said the idea was entirely new and that he would begin operations at once.

"I have been experimenting in a limited way for some time with cement, and I believe I have discovered a method by which I can extract large amounts of potash from the dust and refuse which goes to waste through chimneys leading from the kilns," he said.

When pressed for details Mr. Rhodes said the dust will be drawn from the stacks by suction and washed. He said the process was a simple one but would not discuss it further.

\*Bowles, Oliver.—Rock quarrying for cement manufacture, Bureau of Mines Bulletin 160, pp. 37-38. (In press.)

# Some Significant Wheat Yields

## Ground Limestone and Ground Phosphate Rock Greatly Increase Crops

WHEAT THRESHING has begun on the University of Illinois experiment fields. The accompanying table yields from the Oblong field, in Crawford county, is reported by Mr. Harrison Fahrnkopf, who is superintendent of several soil experiment fields, including that at Oblong.

Acre yields of wheat from Illinois Experiment Field at Oblong, 1918:

SOIL TREATMENT APPLIED	BUSHELS
None (average of three tests).....	8.8
Farm manure.....	15.8
Manure and limestone.....	22.7
Manure, limestone, rock phosphate.....	33.4
Crop residues.....	13.2
Residues and limestone.....	30.5
Residues, limestone, rock phosphate.....	36.1
Residues, limestone, phosphate, kainit.....	38.8

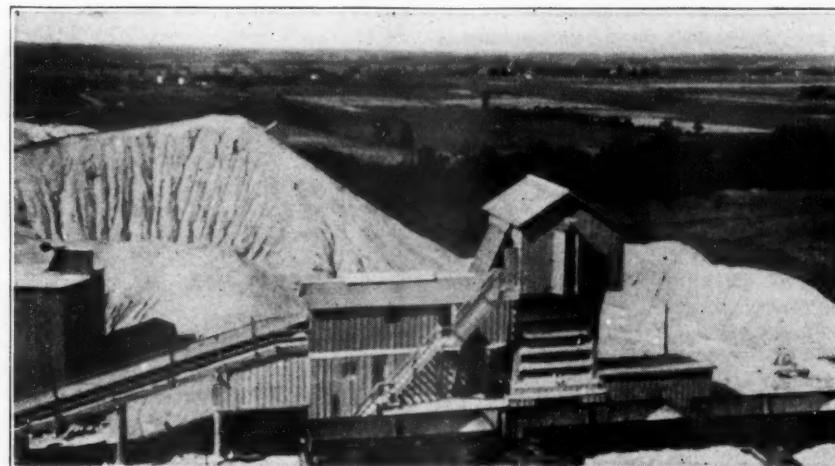
These records show that as an average the yields of wheat were increased nearly 6 bushels per acre by the organic manures, about 12 bushels more by limestone and 8 bushels in addition by phosphate. In permanent systems of soil improvement, with ground limestone, fine ground raw rock phosphate, and home-grown manures, the average yield was nearly 35 bushels per acre, or about four times the yield from untreated land, which of itself produced less than 9 bushels of wheat.

The Oblong experiment field is located on the common prairie soil of southern Illinois, and these systems of practical, permanent soil improvement are equally applicable to millions of acres of similar land. Why expend labor to farm forty acres when the same amount of wheat may be grown on ten acres? Cyril G. Hopkins.

University of Illinois.

## Agricultural Limestone Plant Its Own Advertisement

LOCATED on a ridge which overlooks the beautiful farming country on the New York shore of Lake Ontario, the Pekin plant of the Empire Limestone Co., of Buffalo, N. Y., is its own best advertisement. The great piles of white limestone screenings, waiting to be pulverized, can be seen from the country below for miles around. The plain seen in the distance of the accompanying view is part of New York state's richest agricultural belt. The farmers come from miles around to get the limestone in their own wagons. Certainly no plant ever had a more ideal location for advertising its wares.



Plant of Empire Limestone Co., Pekin, N. Y.

## California Nitrate Deposits Are Not Extensive

IN DECEMBER, 1917, the Secretary of the Interior was informed that large deposits of nitrate of soda had been discovered in Amargosa Valley, Inyo County, southeastern California. As these deposits were said to be large and rich enough to relieve the United States of the necessity of importing from Chile the sodium nitrate required for making munitions and fertilizers, and as the need of using all available shipping for other war work was urgent, the Secretary at once called upon the Geological Survey to examine the deposits.

Four geologists were accordingly sent from Washington to make the examination, and on reaching California the party was increased by the addition of another geologist and 10 other men, most of them experienced miners. The results of this examination by no means justify the optimistic reports previously made by the Secretary of the Interior.

When you buy War Savings Stamps you do not give your money, you loan it at 4 per cent compounded quarterly. You help your Government, but you help yourself even more.

## Demand for Limestone Growing

### From One End of Country to Other Educational Campaigns Are Creating Big Markets

THE DEMAND for agricultural limestone is constantly growing and producers appear to be unable to meet the demand, according to news reports from all over the country. This condition is largely due to county farm agents, agronomists and agricultural advisors who have pursued an educational campaign and have stimulated a desire among the farmers in many states and sections for limestone.

Owing to the educational work of County Horticultural Commissioner Earle Mills of Butte county, Calif., the word has spread to neighboring counties, and now effort is being made by local citizens, led by H. C. Flournoy of Quincy, Plumas county, to organize a company to produce agricultural limestone. Mr. Mills has informed the fruit raisers that the addition of limestone will greatly increase the fruit yield.

In Iowa, the county agent of Adams county has been trying to get agricultural limestone for his constituents, who have been taught the need of the sweetener. Three-fourths of the land in the county is

too acid to grow clover and alfalfa, and the yield of oats, wheat and corn is kept at a minimum because of the lack of lime. He has succeeded in getting a very low price a ton from producers at Louisville, Nebr., and is now working to get a lower freight rate.

The Bessemer Limestone Co. at Hillsdale, Pa., has just completed the installation of additional machinery that will increase the company's output of agricultural limestone. Business in the agricultural limestone department has just about doubled in the past year, states Fred Kangeiser, general manager.

These are only samples of the reports which have been coming to the office of ROCK PRODUCTS for several months.

An important part of the report of the Agricultural Advisory Committee recommending the placing of agricultural lime and limestone on the preferred list, is the specific statement that the production of ground limestone should be encouraged and equipment makers be given priorities.

# For Safety Methods at Cement Plants

## Some Principles that Apply with Equal Force to Lime and Stone-Crushing Plants

THE MAJORITY of our accidents can be prevented if we put the work on the right basis; if we talk less and act more. The easiest way to get rid of any problem is to say that it cannot be done, that we have no time to bother with it, etc. Let us get away from those lame excuses. What about the whisky and saloons, evils which only a short time ago seemed to have roots deeper than any man could dig? They are now disappearing and will never come back. It could not be done, said the people a short time ago, but now it has been done. Preventable accidents have caused as much suffering as the whisky and the saloons, and they must be eliminated. The present war is being fought by the United States for an ideal. The war against accidents should be fought the same way.

### Proper Machinery Guards

Accidents happen either because machinery or appliances have not been guarded, or they happen because of careless action on the part of the injured himself or some other person. The guarding of machinery should never be an obstacle in accident prevention, as it is in most cases only a matter of money, and I believe that the money used for this purpose is well spent and should be spent cheerfully.

Gears, belts, pulleys, conveyors, etc., can be guarded, and there can be no question about it—all that is necessary is good will.

In some plants machines of almost any description are guarded in the most efficient manner. The workmen appreciate this condition and boost for safety by keeping the guards in their designated positions, and last but not least by adopting safe methods at work where their safety does not depend on guards.

At other plants of exactly the same nature and similarly equipped the same kind of machines can be seen running without being properly guarded because, as said before, the easiest way to get rid of a difficult problem is to say that it cannot be solved. Have we reason to be surprised when the workmen in such plants seemingly do not show any interest in safety work?

In this manner the greatest possibilities for success in accident prevention work are neglected, for let us not forget that a careful man is the best possible safeguard and at the same time a decided asset to your plant in comparison with a careless man who is certain to become a liability sooner or later.

### Elimination of Carelessness

The accidents which happen because of

By H. G. Jacobsen  
Manager Bureau of Accident Prevention  
and Insurance, Portland Cement  
Association, Chicago, Illinois

somebody's carelessness are by far the most numerous, but they can all be prevented if the proper spirit is created. It is folly to expect any result in this direction if it is left entirely to the employees; they will do their part, but it is up to the management to take the initiative and show them the way.

The proper time to get in the first blow, so to speak, is when the man is being employed. He should then receive complete instructions in his duties, and the dangers which may be connected with them if the proper care is not used. It is not enough to print rule books and hand a copy to the man, relying upon his reading it when he is off duty. In the majority of cases if such procedure is followed the rule book is generally stuck into a pocket and thereafter entirely forgotten. Rule books are not without value but they must be supplemented with verbal instructions, and in cases where the new employe does not understand the English language an interpreter should be present.

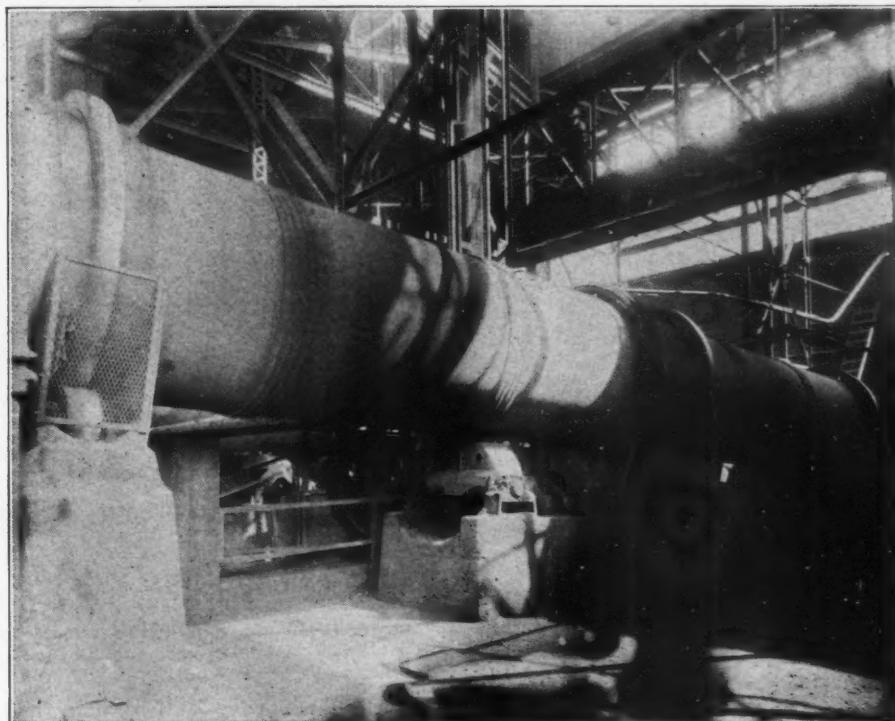
The best method for interesting anybody

in a proposition is to give them some active work in connection with it. For this purpose every plant should have its safety committee composed of foremen as well as workmen.

Aside from the safety committee we have, however, numerous other mediums through which it is possible to create that good fellowship spirit which is necessary in any plant or institution to take the drudgery out of work. Take the trouble of getting acquainted with your men by getting up periodically safety rallies with entertainments of such nature that the men with their families can enjoy them. In this connection I would like to mention that recently a number of our plants have had great success with flag raising celebrations. At these celebrations it has been customary to shut down the entire plant for about two hours, and during that time forget all about everything else but showing the good spirit of fellowship and patriotism.

### Sanitation and Cleanliness

One of the important things that should not be overlooked in speaking of safety is the proper facilities for the comfort of the men. By reason of the isolated locations of many cement plants this is a problem which in many instances is difficult to solve for the reason that sewers, good water, etc., are not at hand. Many plants



Rotary cooler with individual electric-motor drive; motor belt guarded with expanded-metal screen; driving gears enclosed with sheet-steel and screen guards; carriers enclosed; all overhead structures of metal; floors on bridges of perforated metal; railings and toe boards of metal

\*Paper delivered at Seventh Annual Congress of the National Safety Council, St. Louis, Mo., September 16, 1918.

Board was short 190,000 men, that the Ordinance Department is short 120,000 and that the shortage is constantly growing. Therefore man power must be diverted into other channels.

A clean plant, free from rubbish, old repair parts, etc., is also a tremendous help in prevention of accidents. A yard which takes on the appearance of a junk dealer's place of business is the best indication that the safety work is not very far advanced at that particular plant. Not only in the yard but also in the various buildings is it necessary to give close attention to house-keeping. All floors must be kept free of material which is not used in the course of operations, this is particularly true in respect to all overhead runways or platforms, as any material such as bolts, gears, sprockets, chains, etc., left in such places create decided stumbling hazards, or the material may fall and injure people working beneath.

#### First Aid Preparedness

After having taken all possible precautions to prevent accidents, let us remember that in spite of that we shall still have accidents with us. They should be few and far between, but we must be able to take care of them, when they do happen. For this reason it is always necessary to have the first aid department in perfect working order so that it may be ready to meet any emergency.

Each plant should have at least one person in every department so thoroughly instructed in first aid that it is possible at any time to care for the injured before he can be brought to the hospital or doctor. In case of asphyxiation, a few minutes' delay may spell death, whereas if immediate resuscitation measures are taken, the man's life can be saved in the majority of cases. First aid rooms, properly equipped, should be maintained at every plant, and first aid classes conducted by the company's doctor are also important.

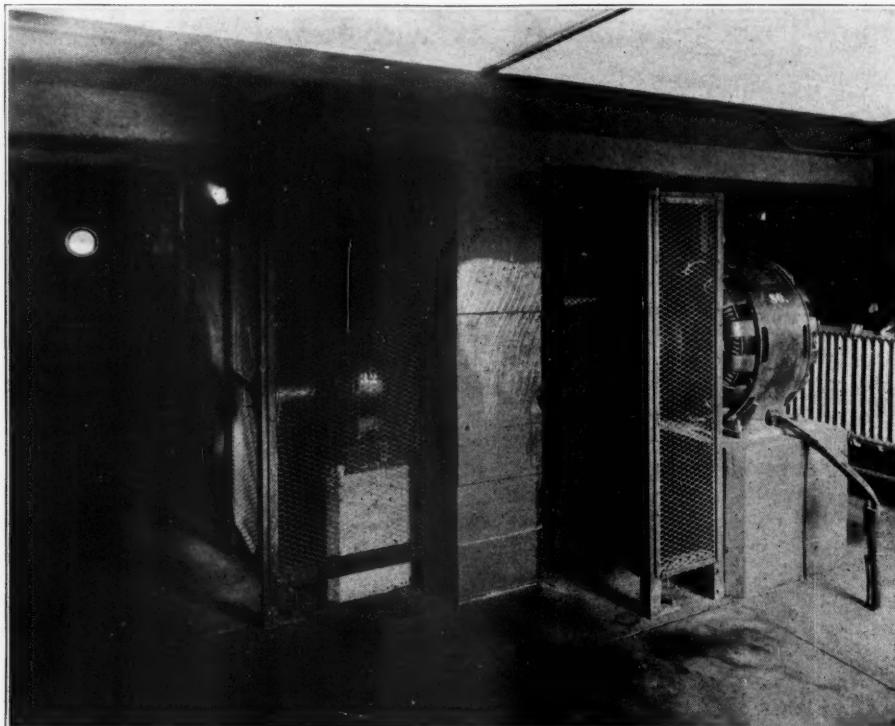
#### Whipple Chief Engineer of Lime Association

WASHINGTON, D. C.—Allen D. Whipple has been added to the staff of the Lime Association as Chief Engineer. For the past year Mr. Whipple has been Chief Engineer of the Structural Bureau of the Portland Cement Association. He will have immediate supervision of the Chemical Bureau of the Lime Association and will serve the other bureaus in an advisory capacity where matters of chemistry and engineering are involved.

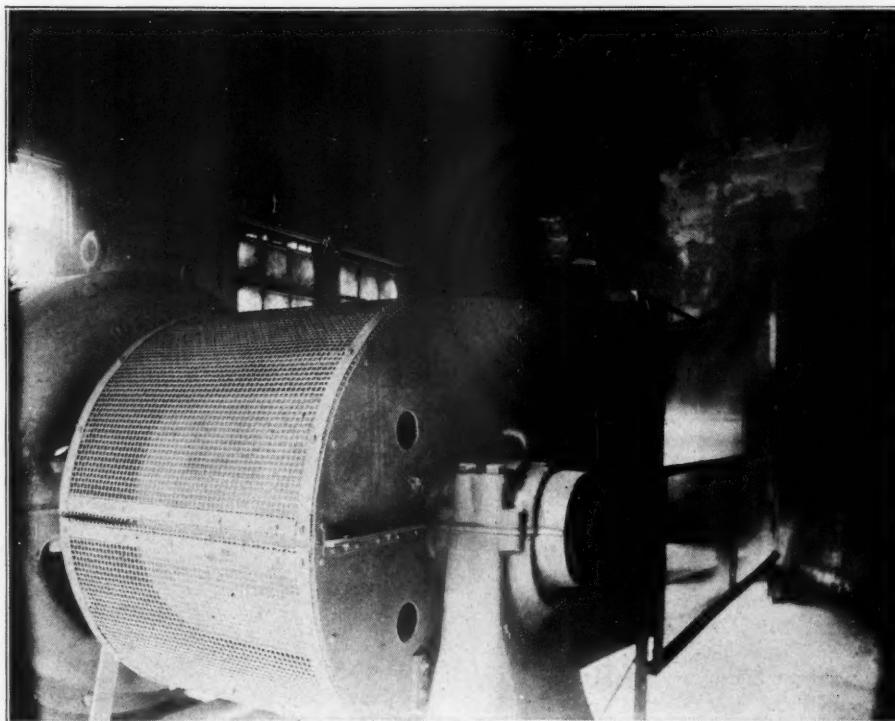
#### U. S. Needs More Men for Ship and Ordnance Boards

ADDITIONAL reasons have been given by Chairman Baruch of the War Industries Board for the curtailing of production in lines not strictly and directly engaged in war work. He recently stated that Chairman Hurley of the Shipping board was short 19,000 men, that the ordi-

## Views Showing How Machinery Is Enclosed for Protection to Employees



Air-compressor drives properly guarded with expanded-metal screens mounted on angle-iron frames held to floor by bolts; gates provided for changing belts and oiling bearings



Motor-drive guard in two sections, top can easily be removed; made of sheet steel and half-inch mesh galvanized wire

nance Department is short 120,000 and that the shortage is constantly growing. Therefore man power must be diverted into other channels.

He indicated two sources for the par-

tial supply of man power lies in the 100,000 traveling salesmen and the 100,000 hotel waiters, workers and bus boys. His desire is to have them transferred to essential war work.

# Western Magnesite Industry

California and Washington Meet Domestic Demand Formerly Met by Imports from Austria-Hungary—Affected Recently by Artificial Product

**I**N SPITE of being 2,500 to 3,500 miles from the great industrial centers of the East the magnesite industry of California and Washington has grown by leaps and bounds since the war. These states produced nearly 317,000 tons in 1917, valued at nearly \$3,000,000. During the same period several artificial magnesites were developed and placed on the market, as described by F. A. Jones, manager of operations of the Kelley Island Lime & Transport Co., in *Rock Products* of July 3.

Calcined magnesite consists essentially of magnesia (magnesium oxide). By different degrees of calcination of the raw magnesite two forms of magnesia are made, which have quite different properties, namely, the caustic calcined magnesite and the dead-burned magnesite. In making caustic calcined magnesite most of the carbon dioxide is driven off, but from 3 to 8 per cent is intentionally left in the residue.

In this form magnesia is susceptible to reaction with water and with carbon dioxide of the air, and it readily combines with certain other reagents, such as magnesium chloride; it is upon this latter reaction that its important use in magnesia cement is based. When calcined at a much higher temperature, driving off essentially all moisture and combined carbon dioxide, the product is dead-burned magnesite, a very dense, fire resistant, and chemically inactive substance. The dead-burned magnesite is used for making refractory materials, including magnesite brick and grain magnesite.

#### Calcining Plants

The process of calcining crude magnesite is practically the same as that for calcining calcium carbonate or limestone. According to the U. S. Geological Survey calcining plants for handling crude magnesite ore in California are owned and operated by the larger producing companies, which have their plants at or near their respective mines. There are also in operation several custom calcining plants which treat ores sent to them by smaller mine operators who have no calcining furnaces of their own. The calcining plants in operation during 1917 were as follows: Pure Carbonic Co., Berkeley, Alameda County, 2 vertical kilns, daily capacity of 14 tons (custom); John D. Hoff Asbestos Co., Oakland, Alameda County, 4 vertical kilns, 40 tons per day calcined (custom); Pacific Carbonic Gas Co., East Oakland, Alameda County, 2 vertical kilns (custom); Sedan Calcined Magnesite Co., Emeryville, Alameda County, 2 kilns; West & Son, of Pittsburgh, Contra Costa county, 2 vertical kilns for calcining magnesite for use

of the Columbia Steel Works, but no mine; Piedra Magnesite Co., Piedra, Fresno County, 1 rotary kiln, 50-ton capacity; White Rock mine (Sweasey), Pope Valley, Napa County, 11 vertical kilns; Sears & Cubbage, Rutherford, Napa County, 2 vertical kilns, 10-ton capacity (custom), Magnesco Refractory Products Co., Winchester, Riverside County, 1 rotary kiln; Sampson mine (Hoff-Price Co.), Sampson Peak, San Benito County, 3 vertical kilns; Western Magnesite Development Co., Red Mountain (Livermore), Santa Clara County, 2 vertical kilns, 30-ton capacity; Pacific Magnesite Co., Red Mountain, Santa Clara County, 1 vertical kiln; Sonoma Magnesite Co., Cazadero, Sonoma County, 2 rotary kilns; Refractory Magnesite Co., Preston, Sonoma County, 1 vertical kiln, 5-ton capacity for dead burned; International Magnesite Co., National City, San Diego County, 1 vertical kiln, 20-ton capacity; Red Mountain Magnesite Co., Patterson, Stanislaus County, 1 vertical kiln; American Magnesite Co., Porterville, Tulare County, 2 rotary kilns, 50-ton capacity; Porterville Magnesite Co. of California, Porterville, Tulare County, 2 rotary kilns, 28-ton and 80-ton capacity; Tulare Mining Co., Porterville, Tulare County, 2 vertical kilns, 40-ton capacity.

In Washington the calcining plants operated by the magnesite producers in Stevens County in 1917 were as follows: Northwest Magnesite Co., 3 rotary kilns  $7\frac{1}{2}$  feet in diameter and 125 feet long, at Chewelah; American Mineral Production Co., 4 vertical kilns about 6 feet in diameter and 20 feet high, at the Allen quarry, and 1 vertical brick kiln 6 by 20 feet and 1 vertical steel kiln 3 by 16 feet, at the Woodbury quarry, west of Valley; Valley Magnesite Co., 3 vertical brick kilns, 20 feet high, 10 to 14 tons daily capacity each, at the Double Eagle quarry, 12 miles west of Valley.

#### Good Prices

The price of crude magnesite at the mines in California in 1917 may be said to have averaged \$10 a ton, but some small mines sold to larger companies for less, and others sold for more to buyers who were in a hurry. Calcined magnesite was sold at \$30 to \$45 a ton, according to character; but if the calcined had also been ground fine for plastic use it brought from \$40 to \$50 a ton. The consumers in the Eastern States had to pay from \$10 to \$12 additional for transportation. Thus to the price of the crude material had to be added the cost of transportation and the cost of calcination, and also the loss in weight resulting from calcination had to be considered, so that the minimum cost even to

large eastern consumers was much greater than when foreign material, cheaply mined and shipped by sea, was available.

#### Demand Falling Off

The Geological Survey says that while the demand was great during the early part of 1917 it fell off quite rapidly toward the end of the year. While the Survey investigators do not state so, this falling off was in all probability due to the rapid growth and success of the artificial magnesite industry in the East. The Kelley Island Lime & Transport Co., the Solvay Process Co., the Dolomite Products Co., and several other Eastern lime manufacturers are now producing artificial magnesite from dolomite limestone and other ingredients.

## Sand-Lime Brick

By Jefferson Middleton

**T**HE sand-lime brick industry, contrary to indications at the beginning of the year, showed decrease in both output and value in 1917 compared with 1916. The causes for the decrease in output are not difficult to find. The principal cause was the general decrease in building activities; the scarcity of labor, likewise a general condition, was another cause, and transportation conditions may be cited as a third reason for this decline. The increase in the cost of production was reflected in the increased cost to the consumer of the principle product—common brick—of \$1.11 per thousand, compared with 1916. Notwithstanding the decrease in the value of the sand-lime brick marketed in 1917 the value in that year was the greatest in the history of the industry with the exception of 1916. The number of operators (47) reporting marketed product in 1917 continued to decrease and was the smallest since 1903, the first year for which statistics were collected by the United States Geological Survey; but the average value of sales per active operator was \$30,220, compared with \$27,813 in 1916.

The decrease in the quantity of sand-lime brick sold in 1917 compared with 1916 was 39,798,000 brick, or nearly 18 per cent, but the decrease in value was only \$53,743, or 4 per cent. Nineteen states reported sales of sand-lime brick in 1917, a decrease of two. Connecticut, Illinois and New Jersey, which marketed brick in 1916 reported none for 1917, and Louisiana entered the list of producers. Twelve of the 18 states that reported marketed production in both 1916 and 1917 showed increase in value in 1917.

In 1917, as for many years, Michigan was the leading state in sales of sand-lime brick, reporting 26 per cent of the total output and value; Minnesota was second, as in 1916; and Wisconsin was third in output and New York was third in value. Common brick represented 98 per cent of the total output and value in 1917.

The average price per thousand for common brick in 1917 was \$7.54, compared with \$6.43 in 1916. For front brick the average price was \$9.36, compared with \$9.64 in 1916.

# How the Government Trains a Quarrying Regiment

Operation of the District of Columbia Quarry by 28th Engineers

THE 28th Engineers, formed in August, 1917, is a quarry regiment. The officers are mining, mechanical and civil engineers, trained at the camps of the Engineer Reserve Corps. The enlisted men are practical quarrymen, about half of them from Middle West quarries. Col. Charles R. Pettis of the regular army is in command.

In the Sept. 28th issue of the "Engineering and Mining Journal," Capt. H. W. Edmondson, of the regiment, describes its training as follows:

"The regiment as such has received training in quarry work as well as in military engineering. Each company has been organized to operate as a unit, by distribution of the skilled men by subsequent training. For training purposes, the authorities took over the quarry and crushing plant belonging to the workhouse of the District of Columbia, situated at Occoquan, and established a tent camp on the north side of Occoquan River, about a mile from the town of Woodbridge, Va.

"Three faces were exposed in the quarry, varying from 80 to 120 ft. in width and from 50 to 90 ft. high, in a disturbed shale formation, in which 65 per cent gneiss occurs. About 1,000 ft. north of the crusher plant lay a massive gneissoid formation, but the fractured condition of the rocks in the quarry afforded a more thorough practice in drilling, in stripping and sorting the rock, so the latter site was selected. The bench system of from 15 to 20 sections is used, drilling being done by two tripod drills. A pneumatic-hammer drill is used in blockholing.

## Narrow-Gage Two-Yard Cars

The main-track system and side-track switches are 30-in. gage with a 25-lb. rail. Two-yard dump cars, hauled by mule to the foot of a 30-deg. incline, dump into a No. 3 gyratory crusher, and the product is elevated to a 48 in. by 12-ft. trommel, from which the plus 2½-in. material is delivered to a No. 6 gyratory, which returns to the same circuit as the discharge from the No. 3 gyratory. The storage capacity is 400 cu. yds., and an adjustable chute permits the direct loading of material into barges.

"Power is furnished by two horizontal tubular boilers totaling 200 hp., using soft coal as fuel. These supply steam for one 18 by 24-in. horizontal non-condensing slide-valve steam engine, which drives the crushing-plant machinery, and also for the 9 by 9 by 11-in. air compressor, as well as the pumps.

"Under the supervision of the regimental engineer officer, each company operates the

quarry for a period of two weeks. The work of the men is changed from time to time, and they are classified and rated according to their aptitude and ability. Individual instruction is given in the care and use of explosives, in machine drilling, tool-sharpening, crusher operation, engine care and upkeep, and in boiler firing, the latter with a view to smoke elimination. Cost sheets are kept of operations and posted in both company and regimental offices, a basis of \$1.60 per day for privates and \$2 per day for non-commissioned officers being adopted. The following costs per cubic yard are for the month of June, 1918, and are based on a total of 2,450 yd. shipped, representing about 4,000 yd. handled in sorting rock for shipment for road work:

## What It Costs

Labor—Stripping, \$.045; drilling, \$.023; loading and sorting, \$.242; crushing, \$.069; power, \$.08; barge and miscellaneous, \$.035. Supplies—Explosives, \$.051; fuel, \$.101 and lubricants, \$.012. Total, \$.668. Four and one-half yards of material was broken to the pound of 40 per cent dynamite used.

"A spirited rivalry exists among the companies, each striving for the record in tonnage and cost. This spirit extends to the squads of the individual companies, with a corporal in command. The company commanders were able to classify and distribute their men to the best advantage, so as to be prepared for the more serious work ahead.

"Intensive military training has been given the men when not engaged in the quarry, and the regiment is now well fitted to accept any of the responsibilities of an engineer regiment. In fact, as the men perfected themselves in drill, bayonet work and military routine, quarrying became a secondary consideration, the first being a desire to get into the front line trenches and try their skill in 'No Man's Land.' "

## Our Quarrymen at the Front

Americans Introduce Gyratory Crushers to France and Learn Something About Road Maintenance

By R. W. Scherer

Secretary Wisconsin Crushed Stone Association

A MATTER of personal interest to many of the quarrymen and pit operators in the country and a matter of pride to all of them, are the achievements of the quarry regiment at the western front. Probably America's greatest contribution to the successes of the allied armies in France has been in an engineering way, building docks, railroads and roads.

It remained for American railroaders to introduce the French to railroad cars of which 3 or 4 carried as much tonnage as an entire French train, and it remained for our quarry boys to put the American crushing machinery and their own practical knowledge to work in the gigantic struggle in France. From the French we may learn a great deal about road construction and more about road maintenance but when it comes to producing and transporting road materials, our own engineers must have been the leaders.

Before the advent of the Americans the French did not use stone crushers to any extent and are not using them now, but quarry their stone and haul it out to the road in pieces of from 5 to 15 lbs. in weight, deposit it in piles along the side of the road, well out of the way of the traffic. The section man or maintenance man then comes along with a stone hammer and breaks up the larger pieces into smaller

ones. What a revelation even the No. 6 gyratory crushers with which one of the regiments was equipped must have been to these road builders and what an enormous saving in man power they must have effected, grinding out more crushed stone in a few minutes than a man could break in an entire day.

And then the French were using horse-drawn rollers. The American steam or gasoline roller and the men to operate them must have speeded up this work considerably. The heavy American truck, too, was comparatively unknown and has not yet ceased to be a wonder to the natives and all of this efficient equipment would have been comparatively useless if, with it, we had not sent the boys that knew how.

In spite of the handicap of what we consider primitive methods, the French engineers have discovered the economy of cheap roads plus maintenance. All of the roads are macadam and of this type they could afford to build and maintain roads everywhere; the landscape is a veritable net-work of roads; so that between two points several routes may be selected. In peace times these roads serve their purpose and on account of its repairability macadam has made good under the extraordinary conditions that obtain in a war zone.

One road builder in the expeditionary force writes, "Altogether it is difficult to understand how any system of roads could handle traffic of such volume, continuity and destructive qualities. Yet I found the main roads in these sectors in excellent condition with smooth surfaces, full cross-section, clean waterways and with plentiful rock supply stored on the sides, in short, to all purposes, as good as new. That this is being done in France indicates that there are lessons to be learned there by the highway engineering forces of all nations."

From somewhere in France an Illinois quarryman writes a graphic account of the heroic service of our quarrymen at the front. How vital a part they have played in the titanic struggle is apparent. He writes: "I have been working all last week with a truck on a road which is right in view of one of Germany's principal strongholds. The only reason they can't see us is because we have the road camouflaged."

"The road we are building is going to be a big factor in enabling the Allies to take this same stronghold. Twice the French have tried to take this place, succeeded each time, but have been unable to hold it because they have not been able to bring up the artillery quick enough on account of not having the road which we are now building. So you can well imagine the importance of these roads."

"I have crossed France and water-bound macadam was the only kind of road I saw and never was a better road for wear in the U. S. The traffic here is endless troop trains, one three-ton truck after another, supply wagons are on the roads all night and then munition truck trains of 3½ to 5½ ton trucks are surely a severe test of any road. Yet since spring, with 100 men, we have operated a quarry out of which we get the crushed stone, have maintained about 90 miles of road and have built 5 miles of new macadam, keeping it open to traffic while building it.

"The Germans have been sending over shells now for the last half-hour. Sounds as though they were only a short distance away. Well, let them come; we were here first."

Three cheers for our quarry regiments!

### Fort Worth Building Many New Homes

**F**ORT WORTH, Tex.—Information compiled by the Research and Publicity Bureau of the Fort Worth Chamber of Commerce from records on file in the office of the City Building Inspector and from data supplied by local contractors and architects show that during the first nine months of this year approximately 360 residences, costing a total of \$1,100,000 have been built in Fort Worth and suburbs and \$220,000 has been spent in repairing and making extensions to residences already built. This means that one \$3,500 home has been com-

## Turn in Building Industry Is Expected by First of Year

Intimation from Washington Is That the Government Will Not Restrict So Much as Regulate Activities

**N**EW YORK—The first definite suggestion of the actual turn in the building outlook came on Wednesday afternoon at a luncheon given to Rudolph P. Miller, who has been the Washington representative of the National Contractors' Association. The dinner was arranged by H. H. Murdock, chairman of the Building Industries of New York organized last winter to help the Government in its war program.

The impression distinctly gathered by those present was that the authorities at

### Remember!

**T**HAT autocracy as we face it today in Europe is organized Brigandry which denies the elemental rights of humanity, the right to live, the right to liberty, the right to the pursuit of happiness. Any man who proposes a compromise or a peace negotiation with this band of brigands is guilty of treason to the kingdom of liberty.—Dr. Lyman Abbott.

Washington, realizing that the peak of Government war time requirements for building materials and construction has practically been reached, have perfected through the National Councils of Defense and similar bodies, a regulative, rather than arbitrarily restrictive, machinery to guide building construction through the unprecedented rush that is sure to occur as soon as Federal war requirements are met.

"Washington is not an ogre, seeking to stifle the building trades of the country," said a high authority close to the War Industries Board. "All repression of building has been for one purpose; to help win the war. The war is being won. A month ago we were not sure about it. Then these various supervisory building committees promised to be called upon to exercise restrictive, if not actually prohibitive powers in the matter of building control. It is probable that in the final working out of these committees their province will be more in the matter of regulating the building work that is to be allowed to proceed rather than actually curtailing all building.

pleted every 6 working hours during this period and extensions and repairs to the amount of \$1,000 have been made each day to old residences.

The cost of 50 per cent of the new homes so far this year has been less than \$2,500 while only 5 per cent have exceeded \$10,000

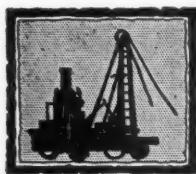
"No one knows better than the various bureaus in Washington the actual conditions of building material supply and demand. Foresight has been a prerequisite in all committees and the building industry as a whole has not been forgotten. Knowing the condition of supply and also that of demand, it is perfectly apparent that there would be an unprecedented rush of men, materials and building money into new construction. To ignore such a condition and to say 'go ahead' would promptly result in a stampede of building material prices and almost an explosive boom condition. The fact that the war is actually being won, tends to create the very seeds that would produce a wild stampede to building that would be disastrous to the builder, to the investor and would create a condition for the very Government itself that would be difficult to say the least, especially since there are other departments beside war and yards and docks and navy that will have construction programs for several years to come and are now being retarded merely because the departments named must have the right of way.

It is reported that provision is already being made to prevent that sort of hysteria that might be expected in an industry where demand is so acute and supply of raw commodities is so low as is that obtaining in the entire building and construction markets of the major portion of the country today."

After the South Amboy explosion the sudden appearance of materials that were considered almost unobtainable revealed the fact that manufacturers had been anticipating the turn-about, says the Dow Service Building Reports. Glass poured into the stricken zone in adequate supply. Basic building materials also loomed large in the emergency.

It was publicly stated last week at Washington that steel would be more available to "accepted" building projects after the first of the year, there will also be more cement available, and the plaster and calcined products departments already look for a change for the better.

each. There is not a single vacant dwelling in the city and the longest period during the past four months that a rent house has been without a tenant was only four hours. Local real estate men claim that they can fill only one order out of every forty for rent houses.



# NEW MACHINERY EQUIPMENT



## Combination Ball Tube Mill

THREE UNITS IN ONE machine is the claim made for the new combination ball and tube mill of the Kennedy-Van Saun Manufacturing & Engineering Co., New York City. The new mill is designed to receive stone from a No. 5 gyratory or similar crusher (about  $\frac{1}{2}$ -in. size) and reduce it to material 95 per cent of which will pass a 100-mesh screen.

The combination ball and tube mill takes the place of three units: A ball mill, an intermediate elevator and screen and a tube mill. The power required is about that required for a tube mill. In general construction it is about the same as a tube mill. It can be used for either wet or dry grinding. It is patented.

The accompanying table shows results of tests made with an 8 by 22-ft. combination mill by the Ohio Electric Light Co., at Tiffin, Ohio. The material was dolomite rock, the size of the feed being 2-in. and less. The tests are reported by the manufacturer.

**HORSEPOWER**  
Starting with clutch 200 kw. = 266 hp.  
Light Load, 110 kw. = 146.66 hp.  
Full Load, 160 kw. = 214.33 hp.

**CAPACITY**  
Average capacity taken at discharge of Elevator 75 lbs. for 5 seconds, which equals 54,000 lbs. per hour.

**Note**—Screen test which would indicate 10 per cent above this test at 95 per cent 100-mesh as follows:

**PRODUCT**  
On 50-mesh—trace.  
On 50 to 100 screen mesh.....  $2\frac{1}{4}$ %  
On 100 to 200 screen mesh.... 21  
Thru 200 screen mesh.....  $76\frac{1}{2}$ %  
100 %

## BALL LOAD

2 tons 4-in. balls.  
2 tons 3-in. balls, recvg. chamber.  
 $3\frac{1}{2}$  tons  $\frac{3}{4}$ -in. balls.  
 $3\frac{1}{2}$  tons  $1\frac{1}{4}$ -in. balls.  
 $3\frac{1}{2}$  tons  $1\frac{1}{2}$ -in. balls, fng. chamber.

$14\frac{1}{2}$  tons.

The accompanying curves show the capacities of ball mills as determined by tests made by the manufacturer in several installations.

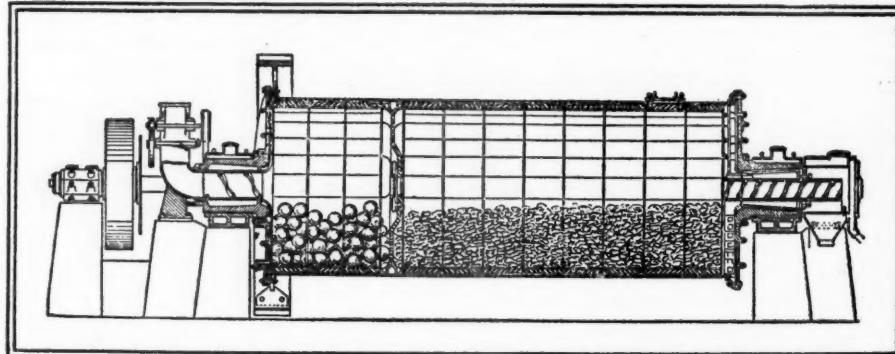
## Hammer Mill with Door Opening

IT IS A WELL KNOWN FACT that high speed pulverizers wear rapidly even on comparatively soft materials, owing to the sand blast action caused by the rapid rotation of crushing members. Nevertheless, such machines are unsurpassed in certain fields, for their enormous outputs more than

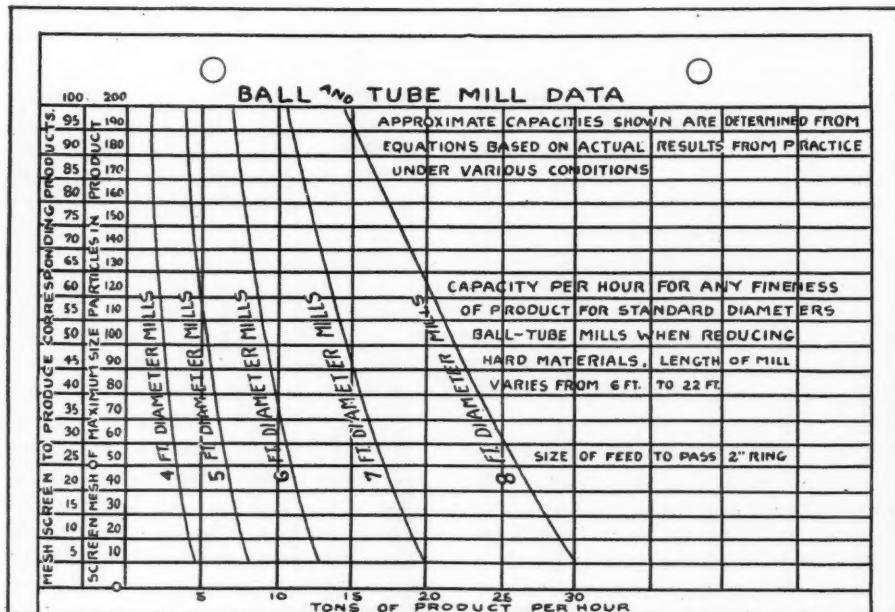
compensate for rapid wear, so that the actual cost per ton of output is extremely low.

It is essential with the hammer type of pulverizer to make frequent adjustments and renewals, to allow for the wear of the working parts, otherwise capacities will rapidly fall off and the cost of production be increased accordingly. A steadily decreasing output is more expensive than the actual shut-down, because the cost of production increases rapidly with worn parts, and after a short period of inefficiency a shutdown is inevitable.

The swing sledge mill, made by the Sturtevant Mill Co., Boston, Mass., is claimed to be practically a continuous producer because one man in one minute, without the use of tools of any kind, can open a door and get at every part of the machine for inspection, adjustment or repair. Thus it is claimed there is no excuse for diminishing outputs, or waiting until the machine loses



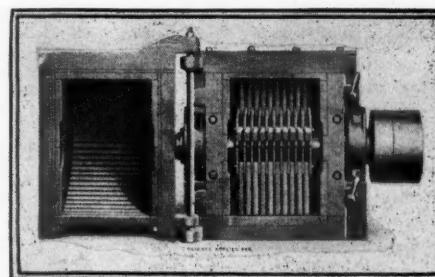
Patented combination ball tube mill reducing from  $\frac{1}{2}$ -in. to 100-mesh



Curves for estimating output of ball and tube mill

its efficiency before adjustments or repairs are made. The door can be opened every morning and every working part of the mill inspected.

This mill has self-aligning ball bearings, dumping grate, and other features of the most improved pulverizers of this class, plus the open door feature, which is claimed to be so important that it overshadows all other points of vantage.



Hammer mill with door opening for making working parts accessible

# The Rock Products Market

## Agricultural Limestone Wholesale at Plant, per Ton

### EASTERN

Coldwater, near Rochester, N. Y.— (80% thru 100 mesh; 100% thru 12 mesh) Analysis, CaCO <sub>3</sub> , 66.77%; MgCO <sub>3</sub> , 41.74% .....	2.00 @ 2.65
Danbury, Conn.—(50% thru 100) Analysis, CaCO <sub>3</sub> , 96%; MgCO <sub>3</sub> , 2%; ppr., \$4.00; bulk.....	2.75
Hillsville, Pa.—(90% thru 100 mesh) in 80 lb. ppr. bags, \$4.50; bulk.....	3.00
Jamestown, N. Y.—(90% thru 100 mesh)—Bags .....	2.50
Pownal, Vt.—(50% thru 100) Analy- sis, CaCO <sub>3</sub> , 96%; MgCO <sub>3</sub> , 2%; ppr., \$4.00; bulk.....	2.75
Walford, Pa.—(70% thru 100; 50% thru 50; 100% thru 10; 50% thru 4) Paper, \$4.50; bulk.....	2.75
West Stockbridge, Mass.—(50% thru 100) Analysis, CaCO <sub>3</sub> , 96%; MgCO <sub>3</sub> , 2%; ppr., \$4.00; bulk.....	2.75
<b>CENTRAL:</b>	
Alton, Ill.—(Pulv. and 90% thru 50 mesh) Analysis, CaCO <sub>3</sub> , 95%; MgCO <sub>3</sub> , 3% .....	2.00
Bedford, Ind.—(90% thru 10 mesh) Analysis, CaCO <sub>3</sub> , 98.5%; MgCO <sub>3</sub> , 0.5% .....	1.75
Columbia, Ill., near East St. Louis —(1/4" down) .....	1.25 @ 1.80
Elmhurst, Ill.—Analysis, CaCO <sub>3</sub> , 29.43%; MgCO <sub>3</sub> , 20.69% .....	1.00
Greencastle, Ind.—(50% thru 50 mesh) Analysis, CaCO <sub>3</sub> , 98% .....	1.75
Illinois, Southern—(50% thru 50 mesh) Analysis, CaCO <sub>3</sub> , 96.12%; MgCO <sub>3</sub> , 2.10% .....	1.75
Lannon, Wis.—(50% thru 50 mesh) Analysis, 53.35%, CaCO <sub>3</sub> ; 43.27% MgCO <sub>3</sub> .....	2.00
Marble Cliff, O.—(50% thru 100 mesh) Analysis, CaCO <sub>3</sub> , 86%; MgCO <sub>3</sub> , 8% .....	3.00
Marblehead, O.—(50% thru 100 mesh; 60% thru 50 mesh; 100% thru 10 mesh)—Analysis (Min.), CaCO <sub>3</sub> , 32.03%; MgCO <sub>3</sub> , 3.75% Bulk, \$3.00; ppr. 80 lb. sack.....	4.50
McCook, Ill.—(90% thru 4 mesh) ...	.75 @ 1.00
McCook, Ill.—(100% thru 1/4" sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 26.04% thru No. 50; 16.27% thru No. 100) Analysis, CaCO <sub>3</sub> , 54.10%; MgCO <sub>3</sub> , 45.04% .....	1.00 @ 1.25
Montrose, Ia.—(90% thru 100 mesh) .....	1.25 @ 1.50
Muskegon, Mich.—(50% thru 50 mesh) Analysis, CaCO <sub>3</sub> , 53.35%; MgCO <sub>3</sub> , 43.27% .....	1.50 @ 2.00
North Industry, O.—(50% thru 100 mesh; and pulverized limestone) Analysis, CaCO <sub>3</sub> , 91%; MgCO <sub>3</sub> , 1.63% .....	3.00
Piqua, O.—(50% thru 100 mesh) .....	2.50 @ 4.00
Rockford, Ill.—Analysis, CaCO <sub>3</sub> , 53.75%; MgCO <sub>3</sub> , 44.35% .....	1.25
Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru 1/4" mesh) Analysis, CaCO <sub>3</sub> , 89.61 to 89.91%; MgCO <sub>3</sub> , 3.82% .....	1.50
Stone City, Ia.—(50% thru 50 mesh) <b>SOUTHERN:</b>	.50
Atlanta, Ga.—(100% thru 10 mesh— all dust contained) combined carbonates, 98% .....	3.00
Brooksville, Fla.—Pulverized lime- stone .....	1.80
Keystone, Ala.—(90% thru 50 mesh) Analysis, CaCO <sub>3</sub> , 99.50%; MgCO <sub>3</sub> , none .....	1.25
Knoxville, Tenn.—Analysis: CaCO <sub>3</sub> , 52%; MgCO <sub>3</sub> , 38% 90% thru 100 mesh .....	3.50
50% thru 50 mesh .....	2.00
Stephensburg, Ky.—Analysis, CaCO <sub>3</sub> , 98% .....	1.20
Winnfield, La.—(50% thru 50 mesh) <b>WESTERN</b>	3.00
Cement, Cal.—(50% thru 100 mesh) Elberry, Mo.—(Pulverized) An- alysis, CaCO <sub>3</sub> , 99.29% .....	4.00
Fresno, Cal.—(All thru 40 mesh) Analysis, CaCO <sub>3</sub> , 98%; MgCO <sub>3</sub> , 1% (50% and 40% thru 200 mesh) sacked, \$5.50; bulk, \$5.00. (100% thru 40 mesh) sacked, \$5.25; bulk Bulk .....	4.75
Kansas City, Mo.—(50% thru 100 mesh) .....	1.50

## Wholesale Prices of Crushed Stone

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

### Crushed Limestone

City or shipping point <b>EASTERN:</b>	Screenings, 1/4 inch down					
	1/2 inch and less	3/4 inch and less	1 1/4 inch and less	2 1/2 inch and less	3 inch and larger	One dollar per net ton, all sizes
Buffalo .....	.....	.....	2.50	1.75	1.75	.....
Burlington, Vt. ....	1.50	.....	1.50	1.50	1.50	1.50
Coldwater, N. Y. ....	1.50	.....	2.10	1.90	1.65	1.40
Frederick, Md. ....	1.50	.....	2.00	1.95	1.75	1.40
Grove, Md. ....	1.50	2.10	2.00	1.95	1.75	1.40
Hagerstown, Md. ....	.....	.....	.....	.....	.....	.....
Hillsville, Pa. ....	.....	.....	.....	.....	.....	.....
North Leroy and Akron, N. Y. ....	.....	.....	.....	.....	.....	.....
Rock Cut, N. Y. ....	.80	1.20	1.20	1.20	1.20	1.20
Walford, Pa. ....	.....	.....	.....	.....	1.35	.....

### CENTRAL:

Alton, Ill. ....	1.85	1.75	1.65	1.45	.....	.....
Belvidere, Ill. ....	.....	.....	1.00 for all sizes	.....	.....	.....
Cincinnati, Ohio. ....	.....	.....	Various sizes \$1.75 per net ton	.....	.....	.....
Cleveland, Ohio. ....	.....	.....	Various sizes \$1.90 per net ton	.....	.....	.....
Columbia, Ill. (near E. St. L.) ....	1.25 @ 1.80	.85 @ 1.20	.95 @ 1.30	.95 @ 1.30	.80 @ 1.20	.....
Detroit, Mich. ....	.....	.....	Various sizes \$1.50 per net ton	.....	.....	.....
Dundas, Ont. ....	.65	1.10	1.10	1.10	.90	.90
Eden and Knowles, Wis. ....	.80	.80	1.00	1.00	1.00	1.00
Elmhurst, Ill. ....	1.00	1.00	1.00	1.00	1.00	.90 @ 1.00
Ft. Wayne, Ind. ....	.....	.....	Various sizes \$1.60 per net ton	.....	.....	.....
Gary, Ill. ....	1.05	1.05	1.05	1.05	.80	.80
Greencastle, Ind. ....	1.00 @ 1.25	1.00 @ 1.25	.70 @ 1.15	.70 @ 1.00	.70 @ 1.10	.70 @ .90
Illinois, Southern. ....	1.25	1.25	1.25	1.25	1.25	.90
Lannon, Wis. ....	.....	.....	1.00 all sizes	.....	.....	.....
Lima, Ohio. ....	1.00	.....	1.10 for all other sizes	.....	.....	.....
Linwood, Scott Co., Ia. ....	.50	.....	1.13	1.05	1.13	.....
Maysville, Wis. ....	.70	.70	1.10	1.10	1.10	1.10
McCook, Ill. ....	.75 @ 1.25	1.00 @ 1.75	.70 @ 1.15	.70 @ 1.00	.70 @ 1.10	.70 @ .90
Oshkosh, Wis. ....	.....	.....	1.00 in all sizes, Blue Limestone	.....	.....	.....
Ottawa, Can. ....	1.90	2.00	2.00	1.75	1.50	.....
River Rouge, Mich. ....	.60 @ 1.00	.95 @ 1.00	.95 @ 1.00	.95 @ 1.00	.95 @ 1.00	.....
Rockford, Ill. ....	1.25	.....	.....	1.25	1.25	1.25
Saginaw, Mich. ....	.95	.95	1.05	1.05	.95	.95
Sheboygan, Wis. ....	.....	.....	.80 @ 1.00 for all sizes	.....	.....	.....
Stone City, Ia. ....	.....	.....	1.20	1.10	1.00	.....

### SOUTHERN:

Atlanta, Ga.—Dolomite. ....	.....	2.40	2.30	2.20	2.10	.....
Brookville, Fla. ....	.....	.....	2.50	.....	.....	.....
Fort Springs, W. Va. ....	.50	1.20	1.20	1.35	1.10	1.10
Irvington, Ky. ....	.75	.....	.....	.75	.75	.....
Stephensburg, Ky. ....	.....	.....	1.20 any size	.....	.....	.....
Winnfield, La. ....	1.20	1.80	1.80	1.80	1.80	1.80

### WESTERN:

Atchison, Kans. ....	.25	1.30	1.30	1.30	1.20	1.20
Blue Sprgs. & Wymore, Neb. ....	.15	1.35	1.35	1.25	1.15	1.10
Carthage, Mo. ....	1.50	1.50	1.25	1.25	1.25	1.25
El Paso, Tex. ....	.....	.....	.....	.....	.....	.....
Kansas City, Mo. ....	.50	1.25	1.25	1.25	1.25	1.25

### Crushed Trap Rock

City or shipping point <b>EASTERN:</b>	Screenings, 1/4 inch down					
	1/2 inch and less	3/4 inch and less	1 1/4 inch and less	2 1/2 inch and less	3 inch and larger	2.00 per cu. yd. for any size produced
Baltimore, Md. (vicinity)— Trap .....	1.50	3.25	2.85	2.75	2.25	.....
Birdsboro, Pa. ....	1.25	1.75	1.50	1.25	1.25	1.25
Duluth, Minn.—Trap .....	.65 @ .75	1.35 @ 1.50	1.25 @ 1.35	1.15 @ 1.25	1.15 @ 1.25	.....
Farmington, Conn. ....	.70	.85	.80	.....	.....	.....
Glen Mills and Rock Hill, Pa. ....	1.10	1.40	1.60	1.60	1.60	1.40
—Trap .....	.....	.....	R. R. ballast 1.40	.....	.....	.....
Little Rock, Ark.—Trap .....	.....	1.75	.....	1.75	1.50	1.35
Millington, N. J. ....	1.75	1.85	1.75	1.75	1.60	.....
Montrose, Ia.—Trap .....	.....	1.10 @ 1.20	1.10 @ 1.25	1.05 @ 1.10	1.00 @ 1.10	.....
Morristown, N. J.—Trap .....	1.85	1.75	1.75	1.60	1.40	1.40
New Britain, Conn. ....	.75	1.30	1.25	1.20	1.10	.....
North Branford, Conn.—Trap .....	.80	1.30	1.25	1.20	1.10	.....
Oakland, Cal. ....	1.90	1.90	1.75	1.75	1.75	1.75
Stephensburg, Ky. ....	.....	1.26 per cu. yd. for any size produced	.....	.....	.....	.....
Westfield, Mass.—Trap .....	.60	1.00	1.10	1.00	.90	.....

### Miscellaneous Crushed Stone

City or shipping point	Screenings, 1/4 inch down					
	1/2 inch and less	3/4 inch and less	1 1/4 inch and less	2 1/2 inch and less	3 inch and larger	2.00 per yd. for any size made
Boulder, Colo.—Sandstone ...	1.00	.....	.....	.....	2.25	.....
Brooksville, Fla.—Flint ...	.....	.....	.....	.....	.....	.....
Fair Oaks, Calif.—Crushed Bldrs. ....	.85	1.05	.95	.85	.85	.....
Hendlers, Pa.—Quartzite ...	.75	1.00	1.35	1.25	1.00	1.00
Little Falls, N. Y.—Syenite ...	.60	.....	.....	.....	.....	.....
Richmond, Va.—Granite ...	1.25	1.50	1.50	1.50	1.50	1.50
Stephensburg, Ky. ....	1.26 per cu. yd. for any size	.....	.....	Basalt and other kinds	.....	.....
Stockbridge, Ga.—Granite ...	.50	2.10	2.10	2.00	2.00	1.95
Webb City, Mo.—Flint ...	.60	.35	1.25	1.25		



## New York Wholesale Prices

(Continued from page 36.)

North River bluestone, per cu. ft.	1.05
Seam face granite, per sq. ft.	1.00
Brier Hill sandstone, per cu. ft.	1.50
Gray Canyon sandstone, per cu. ft.	.95
Buff Wakeman, per cu. ft.	1.50
S. Dover marble (promiscuous mill blocks, per cu. ft.)	2.25
White Vermont marble (sawed), New York, per cu. ft.	3.00

The material markets with but few exceptions are quiet, with orders not in great volume, and inquiries for future deliveries light. Practically all of the material demand is emanating from other direct or indirect Government business and such non-war construction as was substantially under way at the time of the ruling of the War Industries Board relative to the curtailment of non-war building operations.

Material prices are well maintained in almost all lines.

The demand for trap rock and crushed limestone is exceptionally heavy and dealers in both materials are being hard pushed to keep their deliveries ahead of new orders. The demand is almost without exception for direct and indirect Federal construction.

**Trap Rock**—Dealers in this material are loaded to their full capacity with orders and the new demand is exceptionally heavy. At the present time as well as for weeks past about 95 per cent of the deliveries of trap rock is going to direct and indirect Government building operations and the balance into non-war work. The Government has established the price now being quoted for all deliveries within lighterage distance of the city at the following rates: Trap rock, 1½ in., \$1.85 per cubic yard, and ¾ in., \$2 per cubic yard.

**Building Stone**—Owing to the general recession of building construction other than essential war operations there is but little activity in the market for building stone. Government projects almost without exception are the predominating factors in the building situation throughout the country and operations of this character use but little, if any, stone. Prices are unchanged since the last quotation.

**Window Glass**—A trade rumor persists to the effect that the Government is making a determined effort to conserve the available supply of window glass for the most essential uses and will probably place a drastic restriction on future glass sales. An additional factor that will most likely operate adversely in the glass manufacturing industry would be a restriction against the renewal of manufacturing operations until next spring. Glass stocks at the factories are at a low ebb. Prices are unchanged at the present writing.

Give our boys in the Army and Navy every fighting chance. Pledge yourself to save to the utmost of your ability and to buy War Savings Stamps.

## Sand and Gravel Business in Des Moines Fair

**D**ES MOINES, Ia.—The sand and gravel business is fairly good here for such abnormal times as these, kept alive largely by government business.

The Flint Crushed Gravel Co., who have a large plant which is a combination of many systems, because of their having most of the Government business have been able to continue in full operation most of the year. They have had a little difficulty because the artillery practice ground is alongside of their property and occasionally a 6-in. shrapnel breaks in the neighborhood. Nevertheless, they have not been put out of business.

The Capital City Sand Co., one of the smaller concerns, were favored in car supply this year because their location is on the same tracks on which the cantonment is located. They have been able to do about as much business as any of the larger concerns.

The Des Moines Sand & Fuel Co. and the Commercial Sand Co. have been able to keep business going. Frank Cram & Sons, who own two plants, found it advisable to close down one of them.

The Coon River Sand Co. started to build a new plant last spring. They got most of the railroad track completed, built a work shop and a dredging boat, ran electric wires on the location, had all the lumber, pumps, motors and machinery on the ground, and then—and then—"darn the Kaiser." The new freight rate went into effect which crippled the location. The new freight rate is just double that of competitors. Car shortage and labor shortage completed the crippling process.

The Des Moines Building Material Co. has closed down for the present and the Portland Sand Co. has not tried to operate this year.

## Memphis Keeping Busy on Government Jobs

**M**EMPHIS, Tenn.—The large operators here in sand and gravel lines report that they are quite busy, a good deal of their material going to the government. Road construction is somewhat in abeyance yet; military roads and necessary exceptions here would be about as much as could be done in the winter months anyway. October is the great month of the year in this part of Mississippi Valley, bright and open, moving month, cotton picking time, oil mills active and generally a little spurt of building.

Lime quarries, clay pits and gravel pits in this section will be as busy for the next 60 days however as labor conditions will permit. The necessary railroad work is a big item. The latest news is that the Memphis Terminals on the Mississippi river will be underway before a great

Railroad consumption of gravel is on a

big scale. Operations at gravel and chert pits in Tennessee, Kentucky and Mississippi is as active as labor conditions will permit. The Wolf River Sand Co. at Memphis, Batesville Gravel Co., Memphis Sand and Gravel Co. are all active.

Two large hospital jobs in which much concrete work will figure, still hangs in abeyance at Memphis. One is a government proposition and will probably mean only the remodeling of a structure already up and the other is the Methodist Hospital, of which movement Thos. B. King, of Memphis, is in charge at the present time.

Many of the Southern cities are interested in the announcement of the conference held in Washington, D. C., early this month to promote the movement to convert the Bankhead National Highway into a military highway. Representative Stevens of Mississippi has introduced a bill providing for a military road from Washington to Memphis. The Dixie Highway from Evansville south through Kentucky and Tennessee has made good progress the present summer. Mayor Benj. Bosse is at the head of this highway movement.

## Cement Plants Suffer From Lack of Power.

**I**N THE LEHIGH VALLEY section of Pennsylvania, the outlook for the winter season among the cement plants is not very encouraging. Considerable curtailment in the supply of electric power due to the demands of the munition works has compelled many cement plants to operate at capacities below the normal requirements allowed by the Government.

Until the passage of the power bill, now being considered by Congress, there is no indication of any great relief in this situation. The Lawrence Portland Cement Co., at Siegfried is reducing its present force of employees, as is also the Coplay Cement Co., Coplay, in connection with its cooper shop. The plants of the Lehigh Portland Cement Co., are working upon a capacity basis, and it is understood that the mills are furnishing considerable material for Government construction. The Atlas Portland Cement Co. has closed down its No. 2 mill at Northampton, which has been engaged in the manufacture of cement for the Government.

## Potash and Phosphate Market

**A** NEW YORK report says there has been a strong demand for phosphate rock and prices have advanced slightly. Miners have received an increase in wages but not as much as they had demanded.

In San Francisco, some low-grade potash has been marketed at about \$5.00 a unit, but there is little activity. Increased production of potash from kelp is noted and steady production from cement plants continues.



# Passed By The Screens



## Manufacturers

**Baumont Mfg. Co.**, Philadelphia, Pa., catalog 37, giving descriptions, illustrations and dimensions of Standard Beaumont gates for controlling the flow of granular material from bunker. The design of ash pits under boilers and the correct gate to use for this purpose are illustrated.

**W. J. Crouch Co., Inc., and Rownson, Drew & Clydesdale, Inc.**, announce the amalgamation of their respective organizations. All trading and manufacturing operations henceforth will be conducted under the name of Rownson, Drew & Clydesdale, Inc., with general offices at 68 Williams Street, New York. P. G. Donald, president of Rownson, Drew & Clydesdale, Inc., will continue in this office, while I. Smulian, president of the W. J. Crouch Co., Inc., will act as managing director of the new firm. Messrs. Victor E. Karminski and A. E. Hearne, both treasurer and general manager of the W. J. Crouch Co. and Rownson, Drew & Clydesdale, respectively, will in future act as joint general managers of the new concern, Mr. Karminski conducting the Crouch steel division and Mr. Hearne directing all other trading operations. Elaborate plans have been made for the further development and expansion of the Rownson, Drew & Clydesdale engineering division. A vigorous advertising campaign will be undertaken under the direction of M. Oppenshaw, who has hitherto had charge of the advertising for the W. J. Crouch Co. H. Lad Landau, assistant secretary and general manager of sales of the W. J. Crouch Co., will continue with the new concern. So will other leading officers of the company.

## Incorporations

**Georgia Potash & Chemical Corp.**, Atlanta, Ga. Capital, \$50,000. Incorporated by C. L. Rimlinger, M. M. Clancy, P. B. Drew, Wilmington, Del.

**New England Minerals Co.**, Boston, Mass. \$250,000. Directors: Francis L. Auld, president; Geo. H. Blake, 52 Devonshire Street, Boston, treasurer, and W. H. Foster.

**Southern Minerals Co.**, Boston, Mass. \$750,000. Directors: E. Wentworth Prescott, president; Geo. H. Blake, 52 Devonshire Street, Boston, treasurer, and W. H. Foster.

A new cement works is to be built near Kjopsnes, in Tysfjorden, Norway. At the head of the enterprise are many large business men in Northern Norway. The capacity of the factory is estimated at 300,000 barrels of cement per year, and the capital stock will be 4,000,000 crowns.

**Northern Alkali & Chemical Company** has been organized at Huntington, W. Va. Ralph D. Lamie, president-manager; John Garvin, secretary-treasurer, both of Huntington; L. E. Garvin, vice-president, Marquette, Mich.; leased building; install tanks, kettles and filter press; machinery cost \$5,000; daily product 1,000 pounds caustic potash. Capital, \$60,000.

## Sand and Gravel

A silica brick plant to employ 1,000 hands is being built at Whycocomagh, Nova Scotia. Major Burton, a retired imperial officer, and E. H. Bcyon, 65 Broadway, New York, are in charge. Contracts for the main buildings have been let.

At Little Ferry, near Hackensack, N. J., the Amburson Construction Co., New York, is building a shipyard for the construction of concrete vessels for the Government. A fine grade of gravel, procurable in this section, will be used. Construction has begun on two vessels.

Harry Donnelly's Ohio Ballast Co. plant has secured a contract for practically all the sand and gravel for the construction of the Cincinnati unit of the Air Nitrates Corporation plant. Mr. Donnelly's gravel plant is within a half-mile of new nitrates plant and the Government has a large fleet of motor trucks hauling material between the plants.

The Public Service Commission, Pennsylvania, has granted an order covering an amount to be paid by the Baltimore & Ohio Railroad for hauling sand to the plant of the Cambria Steel Co., Johnston, from the plant of the Rowena Stone & Sand Co., in the same section. The complaint involved alleged an overcharge on 340 cars of sand shipped to the company.

## Retail Dealers

**Casco Gravel Co.**, Clintonville, Wis., dealers in sand and gravel. Capital \$50,000. R. M. Ellis, George Shackett, G. A. Wurt, incorporators.

**Boyle Granite Co.**, 93-5 Sixteenth street, Milwaukee, Wis., N. M. Boyle, manager, marble workers and dealers, are going out of business.

**Winter Retail Lumber Co.**, Winter, Wis. Capital, \$3,000. E. J. Aschenbrenner, Jos. G. Menacher, C. E. Lovett, incorporators. Dealers in lime, cement, building materials and builders' supplies.

**Struck & Irwin Fuel Co.**, Madison, Wis. Capital \$60,000. Hans J. Struck, Paul F. Irwin and M. B. Olbrich, incorporators. Dealers in retail fuel and building material, cement, brick, lime, tiling, etc.

**Rock County Sand and Gravel Co.**, Milwaukee, Wis. Capital \$75,000. Charles F. Schendel, Milwaukee; Otto J. Krueger, Wauwatosa, Wis.; Theo. Froemming, Milwaukee. Dealers in sand, gravel and crushed rock.

**Conklin & Sons Co.**, Madison, Wis., dealers in retail stone, cement, lime and other building materials, have their capital increased from \$200,000 to \$250,000. President James E. Conklin, 24 E. Mifflin street, Madison, Wis.

**Peshtigo Building Supply Co.**, Peshtigo, Wis. James M. O'Connell, Antoinette O'Connell, Albin Peterson, incorporators; capital, \$15,000. Dealers in building materials, lumber, etc. Attorneys, Miller & Miller, Marinette, Wis.

**Havelock Lumber Company**, Havelock, N. D. For the purpose of buying and selling lumber and building materials. Directors, Fred Rott and Lydia Rott, Venturia, N. D., and Cornelius M. Hunn, Havelock, N. D. Capital \$20,000.

**The John O. Ball & Sons Co.**, of Tonawanda, N. Y., capitalized at \$12,200 to conduct a granite and marble business. The incorporators are John O. Ball, John O. Ball, Jr., and Raymond M. Ball, of North Tonawanda, and Alfred W. Ball, of Buffalo.

**The Ohio Builders' Supply Association**, of which Ralph P. Stoddard is secretary, has moved its office from 354 Leader-News Building, to 1334 Schofield Building, Cleveland, occupying quarters with the National Builders' Supply Association, Charles T. Harris, secretary.

**The Horrabin Construction Co.**, Des Moines, Iowa. Capital stock, \$150,000. General construction, paving and building material. President, James Horrabin; vice-president, William Horrabin; secretary, V. J. Schrader; treasurer, John Marlowe, all of Des Moines, Ia.

## Gypsum Products

The Crown Gypsum Co. of Lythmore, Ont., has surrendered its charter. This company was acquired about two years ago by the Ontario Gypsum Co. of Paris, Ont. This company is now operating the mines at Lythmore in addition to its own original one.

## New Construction

The Linde Air Products Co., Forty-second Street Building, New York, will build a one-story lime works in connection with its new manufacturing plant to be located on Cambria Street, near Eighteenth Street, Philadelphia, Pa. The plant will cost about \$50,000.

## Quarries

The New York Trap Rock Co., Rockland Lake, N. Y., has reduced its capital from \$1,000,000 to \$500,000.

The purchase of the A. K. Schoener farm of nearly 100 acres, at Half-Way, by the Bethlehem Mines Corp., a subsidiary of the Bethlehem Steel Co., has been recorded at Lebanon, Pa. The purchase price was nearly \$25,000, and the property is to be developed for the quarrying of limestone for blast furnaces.

Stone quarries in the vicinity of Peekskill, N. Y., are furnishing a fine grade of crushed stone to the Louis L. Brown Co., Inc., at its shipbuilding works at Verplanck Point, near Peekskill, for the construction of a number of concrete vessels for the Government. These vessels are of barge type, of about 1,000 tons capacity.

## Cement

The Acme Cement Corporation, 8 West Forty-fifth Street, New York, has filed notice of dissolution.

Canada Cement Co., which developed an efficient shell-making organization, has bought a \$250,000 site at Montreal to build a plant to make 12-inch shells for the United States.

Eight women are receiving \$2.80 per day at Speed, Ind., near Jeffersonville, where they are employed at the Portland cement plant of the Louisville Cement Company. The wages paid the women are the same as paid the men and company officials state their work is just as satisfactory.

The new million-dollar cement plant recently built seven miles west of Hanover, Mont., is proving a great success, says a news report. It is turning out cement in great quantity. R. J. Morse, of Denver, general manager of the Three Forks Portland Cement Co., with Superintendent H. F. Leh, of the Trident plant, recently inspected the plant.

The cement works at Elizabeth, Pa., which have been idle for some time, and adjoining territory comprising 6 acres of land, have been purchased by John A. Shaw and others for about \$20,000. The plant was established a few years ago to make cement from furnace slag by a patented process, but operations did not meet with the success anticipated by the owners. How the purchasers will use the property has not been announced.

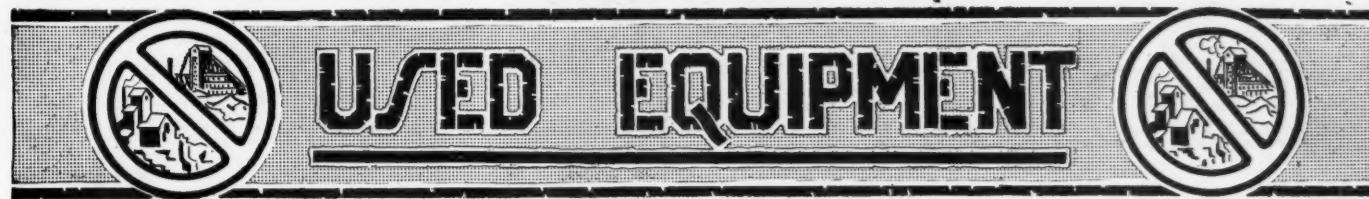
The Bureau of Mines, Washington, has announced that the cementing of oil wells in the North Cushing oil fields of Oklahoma has resulted in a saving of over 2,000 barrels of oil a day from 50 wells. It is held that this will mean an increased revenue of \$4,500 a day to the operators, as well as a considerable increase in gasoline manufacture from the oil saved. It is said that the same plan will be introduced in other oil fields of the country, with an anticipated equally large saving.

## Potash

Dissolution: Antigo Potash & Fuel Co., Antigo, Wis.

The Associated Potash Plants of Alliance, Neb., recently incorporated, hold 4,000 acres of lakes and will erect several small plants at advantageous points.

The potash reduction plant of National and United States Potash Co., at Antioch, Neb., which was destroyed by fire recently, will be rebuilt. The plant comprised two complete units erected at cost of \$300,000. Building, with exception of brick walls, is total loss and most of machinery is believed to have been ruined by intense heat. Fire started in coal chute and spread quickly to roof, getting beyond control of the volunteer fire fighters. Antioch has no fire protection other than chemical engines. Loss fully covered by insurance.



ADVERTISEMENTS in this department are for the Sale and Want of Second-Hand Machinery and Equipment.

RATES: \$2.50 per column inch per insertion.

**STEAM SHOVELS  
LOCOMOTIVES  
LOCOMOTIVE CRANES  
CARS  
RAILS  
HOISTING ENGINES  
GRAB BUCKETS  
CRUSHERS  
COMPRESSORS, ETC.**

Try us for honest value in dependable "used" material of this character.

WE'LL TREAT YOU RIGHT.

**Wm. B. Grimshaw Co.**  
1048 Drexel Building  
PHILADELPHIA, PA.

Dealers in "Used" but "Not Abused" Machinery

**RAILS**

All sections of new and second-hand, on hand for quick shipment. Also purchase old and abandoned plants for dismantling purposes.

**M. K. FRANK, Pittsburgh, Pa.**

**FOR SALE**

Used steam drill and six brand new End Dump Steel Quarry Cars, two yard capacity, equipped to handle from either end or side. Manufactured by Austin Manufacturing Co.

**THE SHERMAN NURSERY COMPANY,**  
Charles City, Iowa.

**FOR SALE**  
**Standard No. 9 Top Shell**

Weight, about fourteen tons; in good condition. Will sell cheap. Reply to Box 1275, care Rock Products

**ROCK PRODUCTS**

**Fills the Bill.**

**Read It!**

**Advertise in It!**

**It Pays!**

**FOR SALE**

25 Ingersoll-Rand steam rock drills; all sizes up to 1 3/4". Reasonable. New York City delivery.

Large assortment of new drill steel: all sizes. Reasonable. New York City delivery.

Boilers and Pumps, Hoists, Traveling Derricks, Rails.

Send me your requirements

**S. S. VAN WAGNER**  
26 Cortlandt Street, New York City, N. Y.

**FOR SALE**

1—Porter Locomotive, 9x16", in fair condition.

1—Marion Steam Shovel No. 373, complete with 2 1/2 yard dipper and boom. All parts in excellent condition, new housing and roof.

The above machinery must be sold at once. If you are looking for a bargain, have this machinery inspected.

**INDUSTRIAL SERVICE CO.**  
LINCOLN, N. J.

**FIRST** —Get Bulletin 250—or, wire

**ZELNICKER IN ST. LOUIS**

before buying or selling

**RAILS**

LOCOMOTIVES      CARS      CRANES  
Shovels      Machinery      Piling, Etc.

What have you for sale?

**GYRATORY CRUSHERS**

1 Gates No. 12 3 Number 5 1 Kennedy 10  
3 Kennedy 6 3 Austin No. 8 2 McCully 7 1/2

Locomotives, Cars,  
Cranes, Steam Shovels

J. F. DONAHOO CO., Birmingham, Ala.

**FOR SALE**

**A Ring and Hammer Pulverizer**

12x15 Slightly Used, Also a 25 H. P. Vertical Twin I. H. C. Gasoline Engine.

W. A. HENDERS,      Ottawa, Ill.

**Idle Machinery  
Absorbs Profits**

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.

*It gets immediate attention if you mention ROCK PRODUCTS.*

**FOR SALE**

1—Williams Crane

Equipped with 25 ft. steel boom and 1/4 yd. Williams Bucket. 7x10 A. H. & D. Engine. On traction wheels, 3 years old, in good condition. Immediate delivery.

1—Stiffleg Derrick

45 ft. boom, 5 1/2x8 A. H. & D. Engine, with Clamshell or Dragline Bucket.

1—Stiffler Derrick

60 ft. boom, 7x10 A. H. & D. Engine, with Clamshell or Dragline Bucket.

1—Derrick Car

Steel frame, self-propelled. 40 ft. boom. 1/4 yd. Clam. Railroad equipment.

**Wisconsin Sand & Gravel Co.**  
52 Patton Building      MILWAUKEE, WIS.

**FOR SALE**

**At Bargain Price**

1 Little Giant Steam Shovel, mounted on traction wheels, equipped with 54" x 8' 6" upright Boiler, 7" x 11" main engine, 5x6 boom and swing engine, one yard rock dipper. Crane has 12 ft. lift. Machine runs on street or road. Flat Wheels: 12 1/2" face. Gauge of wheels 9' 2 1/2", inside to inside of wheels 8' 2 1/2".

Back Wheels: 12" face. Gauge as above. Diameter of Wheels: 3' 6 1/2"; steers from the back.

COMMUNICATE

**FIBORN LIMESTONE COMPANY**  
Sales Department  
Sault Ste. Marie      Ontario, Canada

**FOR SALE**

**COMPLETE STONE CRUSHING PLANT**

Capacity 400 tons per day—Consists of 1—90-hp. Horizontal bricked-in Boiler, 1—75-hp. left drive girder Engine, H. B. Farquhar manufacture.

2—No. 4 Climax Crushers.

1—42-in. x 18-ft. Screens.

Drills, Storage Bins and every necessary facility for up-to-date plant.

For further information address

**L. M. V. TRIMMER, Middle Valley, N. J.**

**WANTED**

a set of 42 inch rolls for crushing rock

**The WOODVILLE LIME PRODUCTS CO.**  
1341 Nicholas Bldg., Toledo, Ohio

**RAILS - RAILS - RAILS**

NEW RAILS  
16-20-25-40-70-80  
RELAYERS

30-35-56-60-65-85

**MORRISON & RISMAN**  
RAIL DEPARTMENT: BUFFALO, N. Y.

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ADVERTISEMENTS in this department are for Positions Wanted, Positions Vacant, Business Opportunities, Plants for Sale, etc.

RATES: 25c per line, per insertion; minimum charge, 50c. With display of any sort, \$2.50 per column inch, per insertion.

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### FOR SALE

#### ONE KILN LIME PLANT

Agricultural limestone pulverizing plant badly needed. Analysis of rock CaCo 96.89, MgCo 1.00. Owner wishes to sell on account of other business; will sell controlling interest or entire plant and quarry. Address:

T. E. HOPSON

Ft. Towson, Okla.

### FOR SALE

Five 10 ft. Morgan Gas Producers, complete with George Automatic Feeds. This is a complete Gas Plant with all flumes and necessary connections.

For particulars address

J. E. BAKER COMPANY

114 North George Street York, Pa.

FOR SALE OR LEASE: Crushed stone quarry situated near Wilkes-Barre, Pa. Very hard green sandstone, practically equal to trap rock for road material. Quarry equipped to produce five to six hundred tons per day—has frequently run eight hundred.

Ample rail facilities and an extensive market. For detailed information communicate with Arthur L. Stull, 182 S. Franklin St., Wilkes-Barre, Pa.

FOR SALE—Limestone crushing plant with 5 lime kilns. Forty acres stone land. Eastern part of Indiana. Details furnished. Address Box 1264, care ROCK PRODUCTS.

## Help Wanted

WANTED: Competent man to take charge of stone quarry producing crushed stone for railroad ballast, highway purposes and concrete work. State age and experience, also salary required, as well as where last employed. Address Box 1254, care ROCK PRODUCTS.

WANTED: Competent factory superintendent; chemicals; must understand plant upkeep and output. Address, stating age, experience and salary expected, Box 1276, care of ROCK PRODUCTS.

WANTED—Granite cutter. Steady work. Terre Haute Monument Co., Terre Haute, Ind.

## Plant Wanted

### WANTED SMALL LIME PLANT

in northwestern Ohio.

Give analysis of stone  
Address Box 1274, care Rock Products

## Capital Wanted

### Additional Capital Wanted

In Crushed Stone and Slag Business  
Plants in daily operation and entire output sold of Stone, \$2.50 per ton and Slag, \$1.50 per ton f. o. b. quarry.

J. B. H. JEFFERSON  
Keyser Building Baltimore, Md.



Daily Capacity 9,000 Barrels

## MORE THAN FIFTEEN YEARS OF SATISFACTION

GREAT WATER AND RAIL FACILITIES BEST SERVE THE ENTIRE MIDDLE WEST  
FIVE PLANTS: ALPENA, DETROIT, WYANDOTTE, CLEVELAND AND DULUTH

## HURON and WYANDOTTE

EVERY BARREL TESTED AND GUARANTEED

SOLD BY THE BEST DEALERS

USED BY THE BEST BUILDERS

Main Offices: 1525 Ford Building, Detroit, Michigan

Quality, Quantity, Service



Best Bros.  
Keene's Cement  
The Plaster That Stands  
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Has been used successfully for over a quarter of a century. Prices and illustrated literature containing full information gladly furnished on request. Write Today!

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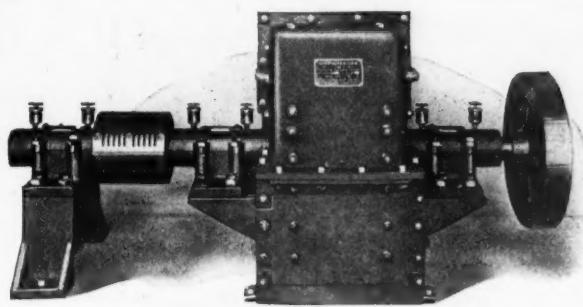
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MEDICINE LODGE, KANSAS

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86 Worth St.  
NEW YORK



**Make Agricultural Lime and Limestone** The Government is urging the use of Agricultural Lime by Farmers and such shipments are exempt from embargoes.

**You Want the K-B Pulverizer**

Because its rugged all-steel construction withstands the most severe service.

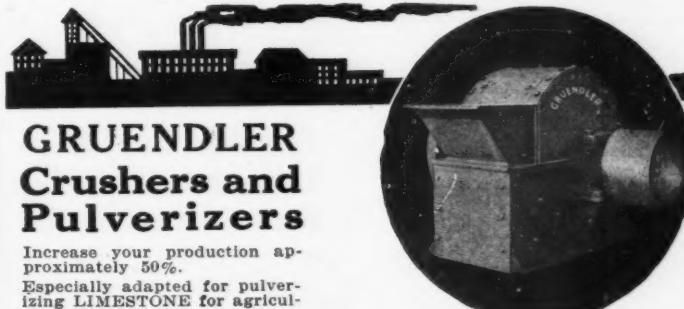
Its manganese steel linings protect all parts from wear. Its adjustable U-Type manganese steel hammers insure a uniform product, with high capacity—and low power consumption.

*Send for Catalog with full particulars.*

**Byers  
Auto-Cranes  
On Broad Road Wheels**



John F. Byers Machine Co.  
318 Sycamore Street  
RAVENNA, O.



**GRUENDLER  
Crushers and  
Pulverizers**

Increase your production approximately 50%.

Especially adapted for pulverizing LIMESTONE for agricultural purposes.

A most efficient machine for large production, small power consumption and BIG PROFITS.

The double-ended hammer arrangement is the reason—let us explain it. Six sizes carried in stock.

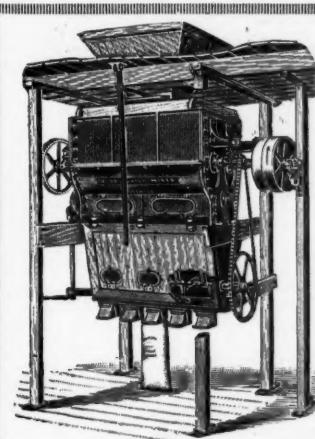
**GRUENDLER PATENT CRUSHER & PULVERIZER CO.**  
ST. LOUIS, MISSOURI

**PULVERIZED  
COAL  
EQUIPMENT**

AERO PULVERIZER CO., 120 BROADWAY, N.Y.

**SCREENS  
of All Kinds**

**Chicago Perforating Co.**  
2445 West 24th Place  
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**THE  
"BROUGHTON"  
MIXER**

Is continuous in operation, and will thoroughly mix any dry materials as fast as two men can bag and remove.

*Let us tell you more about them*  
DUNNING & BOSCHERT  
PRESS CO., Inc.  
327 West Water Street  
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**PERFORATED SCREENS  
MADE TO SUIT YOUR REQUIREMENTS**  
Let Us Quote Prices  
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*Tell the advertiser you saw his ad in ROCK PRODUCTS. He'll appreciate it.*





## CALDWELL Belt Conveyors

Simple—Economical

will solve your handling problem. Simple in design, economical of power, they give the utmost satisfaction. Our forty years' experience has made us thoroughly familiar with the many details of construction necessary to success.

A rough sketch showing the conditions to be met at your plant will bring our recommendations. We should also know the capacity desired and the power available.

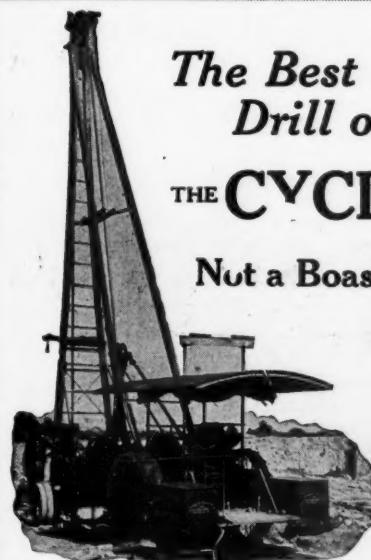
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*Elevating, Conveying and Power Transmitting Machinery*

Chicago 17th Street and  
Western Avenue

50 Church Street  
New York, N. Y.



*The Best Blast-Hole  
Drill on Earth*

THE CYCLONE No. 14

Not a Boast—A FACT

We will prove the superiority of the No. 14 Drill by placing one of the outfitts in your quarry against any or all other makes.

If the Cyclone doesn't out-drill and out-wear all other drills, we will remove it from the work without cost to you.

Our proposition gets below the paint—it eliminates talking points and evaporates hot air. It puts buying on a strictly engineering basis where it belongs.

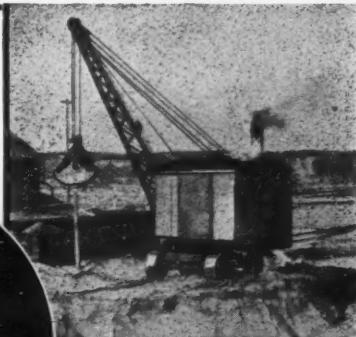
Furnished in Steam, Gasoline, Compressed Air or Electric Power Traction or Non-Traction

Let us send you full particulars

THE SANDERSON-CYCLONE DRILL CO.  
ORRVILLE, OHIO

Eastern and Export Office, 50 Church Street, New York

This ERIE is equipped with a crane boom, and is handling a clam-shell with splendid results. Owned by HURON SHORE GRAVEL CO., Saginaw, Mich.



“Our Erie  
is giving  
fine service  
as a crane”

“We have used our ERIE for a year and a half, but it has cost us practically nothing for repairs. We have equipped the ERIE with a crane boom and a  $\frac{3}{4}$ -yd. clam-shell bucket. It digs gravel, strips, and transfers gravel from cars to stock pile, and vice versa, with dispatch.

“It is a very useful tool, and has given us the best of service. We are well pleased with the ERIE's efficiency and value.”—(Signed) John S. Porter, Secy., HURON SHORE GRAVEL CO., Saginaw, Mich.

The ERIE is equally valuable as shovel or crane. It is built far stronger than the usual standard; a RELIABLE shovel or crane.

Write for a copy of Bulletin P. Address:

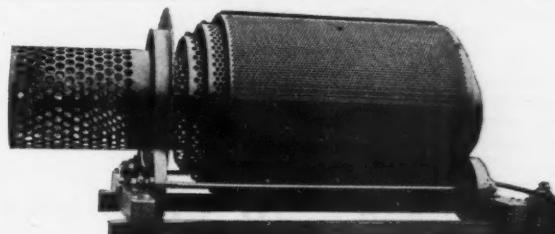
BALL ENGINE CO., Erie, Pa.  
Builders of ERIE Steam-Shovels and Locomotive Cranes,  
BALL Engines

**ERIE** Revolving  
Shovels



STONE SCREEN SECTIONS  
CYLINDERS  
DUST JACKETS

MADE TO FIT ALL MAKES AND  
SIZES OF REVOLVING SCREENS



THE O'LAUGHLIN SCREEN (PATENTED)

SAND and GRAVEL SCREENS  
CYLINDERS SCREEN PLATES  
CONICAL SCREENS  
EVERYTHING IN SCREENS  
QUICK SHIPMENTS

JOHNSTON & CHAPMAN CO.,

2921 Carroll Ave.  
CHICAGO

## To Know It Is to Buy It

Schaffer Hydrators are surpassing all expectations in the way of results.

They are producing the highest grade of hydrate from rock heretofore considered inferior.

The flexibility of

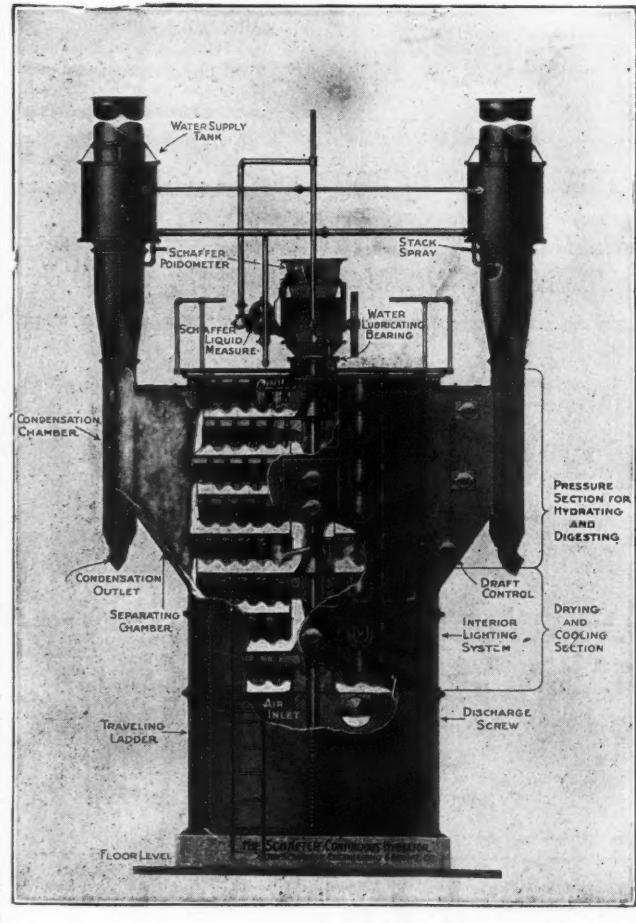
### Schaffer Continuous Lime Hydrators

permit of an adjustment to suit the peculiarities of different lime rock.

They are automatic and continuous and require practically no labor to operate.

### The Schaffer Engineering and Equipment Company

TIFFIN  
OHIO



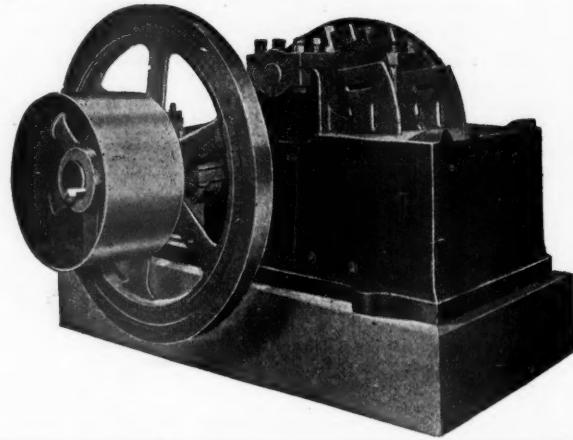
## ENDURANCE

THE armies that are winning battles are not only properly equipped, but they have the endurance to "see the thing through." That is a big virtue in our crushers—they have the power, the capacity, the endurance that make them an economical investment.

*Shall we send details?*

**WEBB CITY & CARTERVILLE  
FOUNDRY & MACHINE WORKS**

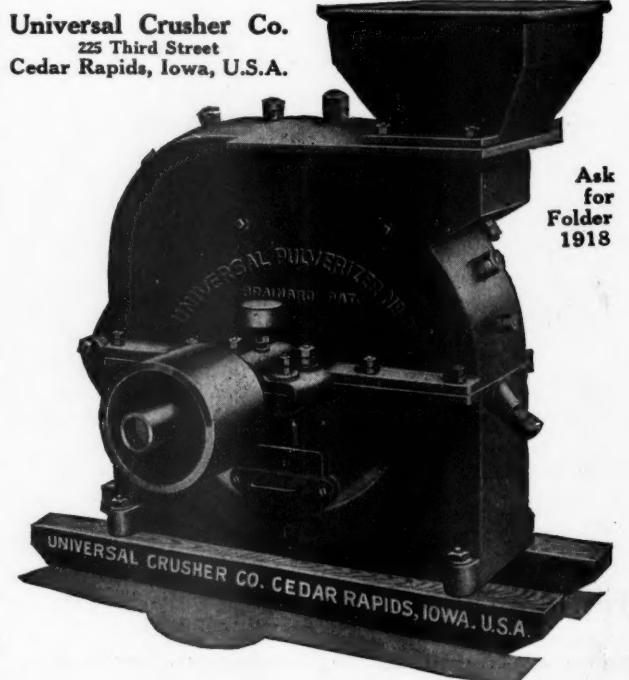
*Main Office:* WEBB CITY, MO.



## UNIVERSAL CRUSHERS

The biggest value for your money. Universal crushers and pulverizers reduce stone to desired size or fineness in a jiffy! Fifteen years of designing and building experience have made possible the exceptional ability of Universals.

**Universal Crusher Co.**  
225 Third Street  
Cedar Rapids, Iowa, U.S.A.



*Saying "I saw it in ROCK PRODUCTS" will bring quick action.*

# STROH STEEL



Your machinery will not wear forever, but if you count on it for five years, the Stroh Steel-Hardening Process will make it last fifteen to fifty years.

#### We Want to Prove That Assertion to You

We want to show you that the Stroh Process, by toughening your machinery, by adding to its strength, by making it hard where hardness is needed, adds to its life, without repairs, making it wear three to ten times as long. Send for catalogue and full information.

#### STROH STEEL - HARDENING PROCESS CO.

PITTSBURGH, PENNSYLVANIA

F. LLOYD MARK  
Monadnock Building, Chicago  
Western Representative

Hickock & Hickock, Portland, Oregon, and  
San Francisco, Cal., Coast Representatives

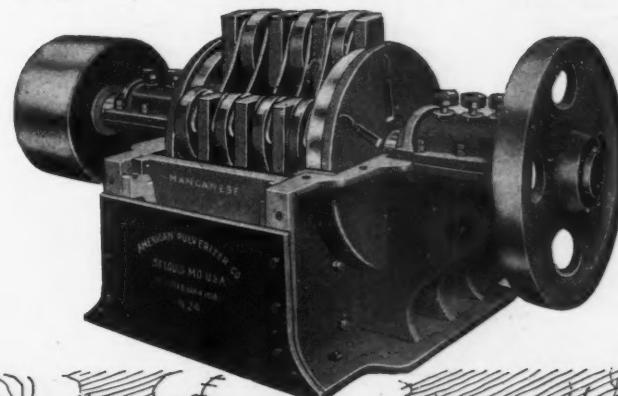
## Agricultural Lime Stone for the Farmer

We guarantee power consumption, wear and tear, upkeep, etc., according to your proposition. Our patented feeder makes the operation of the

### AMERICAN RING PULVERIZER

automatic. Smallest power consumption of any pulverizer made. A simple, powerful, automatic pulverizing machine, guaranteed to fit your needs will make limestone a profitable product for you. The market is continually increasing while limestone is declared an essential by the priority board. Write for prices and plans to

#### Buy a Guaranteed Machine



*For better service say "I saw it in ROCK PRODUCTS."*

# Wherever Fuse is Used

whether it be for the great record-breaking 180,000 ton blast made early this Spring by the Bethlehem Mines Corporation, or for the every day affairs,

## CORDEAU-BICKFORD FUSE

becomes the choice for efficient, sure results. It adds 10 to 20 per cent to the efficiency of explosions—can be set for discharge at one time, in groups or seriatim.

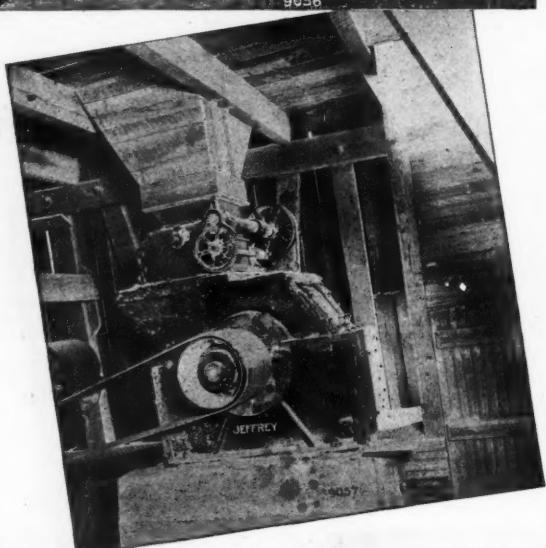
*Not sensitive to shock or friction—it's safe*

**THE ENSIGN-BICKFORD CO.**

SIMSBURY, CONN.

*The Original  
manufacturers of  
Safety Fuse*

**ESTABLISHED  
1836**



### The Clinchfield Lime Company of North Carolina Selects a Jef- frey Type "D" Ball Bearing Swing Hammer Pulverizer

for making agricultural limestone.

The pulverized stone from this quarry is used for sweetening the soil of the farms thru North Carolina and adjoining states.

The Jeffrey Type "D" Pulverizer is giving a maximum capacity of finely reduced limestone for many agricultural lime manufacturers.

**Catalog No. 147-D fully describes  
its superior features. Send for copy.**

The limestone plant illustrated is also equipped with Jeffrey Elevators, Conveyors and Screens.

**THE JEFFREY MFG. COMPANY  
COLUMBUS, OHIO**

*To say you saw the ad in ROCK PRODUCTS gives tone to your inquiry.*

# “Our Name Is Your Assurance”

Every product of this vast factory bears in bold letters the name “Allis-Chalmers,” a guarantee of dependability.

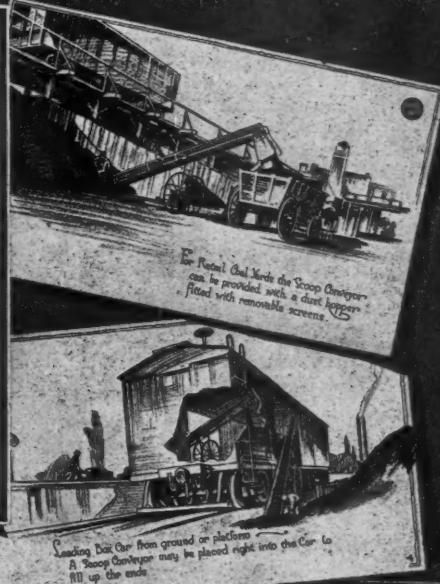
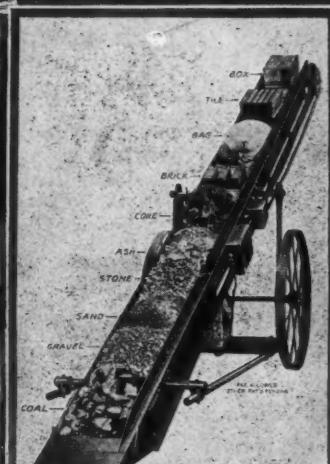


Whether a Motor, Turbine, Crusher, Mill, Kiln, Centrifugal Pump, Engine, or any other machine, apparatus or material made by this great organization, it combines practical experience, highest engineering talent, skilled workmanship and material best adapted to the special purpose of that product.

## ALLIS-CHALMERS

Milwaukee, Wis. U.S.A.

### The SCOOP CONVEYOR



Over one thousand users find this machine an indispensable saver of time, labor and money for rapid, clean and economic loading and unloading of cars, stacking coal, sand, gravel, cement, lime, crushed rock and other loose material, as well as handling boxes, bags, crates and bulky packages of all kinds.



One man and the Scoop Conveyor can do the work of from 6 to 12 men.

Ask for our literature

PORTABLE MACHINERY COMPANY, Inc.

Park Place, Passaic, N. J.

You will get entire satisfaction if you mention ROCK PRODUCTS.

# WEBSTER

Machinery for Conveying  
Elevating, Screening, Washing  
Storage & Power Transmission



## Dependable

Webster machinery stays in action  
—keeps working without interruption.

Any other kind of machinery  
would mean huge loss.

Whether it be sand and gravel  
plants or other forms of elevat-  
ing, conveying or power trans-  
mission machinery "WEB-  
STER" is a safe name to tie to.

Any Webster user will tell you  
that Webster machinery is  
good.

Catalog and engineering sugges-  
tions upon request.

(245)

**The Webster M'f'g  
Company**  
Tiffin Ohio

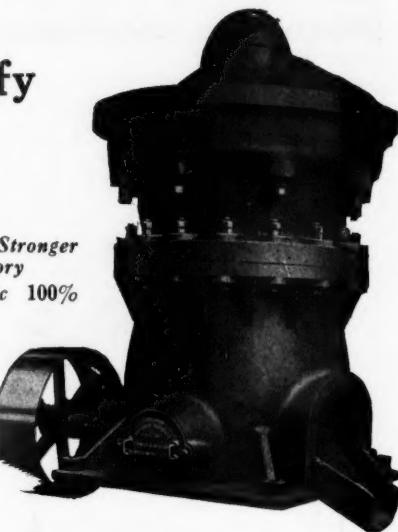
Chicago

New York

You will get entire satisfaction if you mention ROCK PRODUCTS.

## Why You Should Specify the Superior McCully

- 1st Main Shaft Is 60% Stronger Than Standard Gyratory
- 2nd Area of Eccentric 100% Greater
- 3rd Gear and Pinion Cut Steel
- 4th No Deflection of Main Shaft. Vital Parts, such as Eccentric and Gears, automatically lubricated and protected against dust and grit—



## THE NEW SUPERIOR-McCULLY GYRATORY CRUSHER

(Patented)

Two years of experimenting — of rigid trials and tests proved the success of the vital improvements exclusively possessed by the Superior McCully Gyratory Crusher.

Crusher operators were quick to recognize the value of its new and important features. The Superior McCully Crusher instantly sprang into favor. Over one hundred machines are now in successful operation. The success of this new crusher has been so remarkable that competitive machines are now being offered for sale, which claim to have the same improvements. Do not be deceived by a manufacturer who asks you to buy a crusher that has never been tried out and whose claims are wholly on paper. Get the crusher with a big organization and a successful record behind it. The Superior McCully Crusher is protected by patents, and its new original features cannot be found in any other standard gyratory.

*A bulletin describing the Superior  
McCully Gyratory will be mailed upon request*

## Worthington Pump and Machinery Corporation

115 Broadway, New York

Power and Mining Works, Cudahy, Wis.  
Chicago: 820 Old Colony Bldg.

M 476.4

# WHIP-TAP

## TENSION—TONNAGE—CLEAN SEPARATION



Operator turning key to bring WHIP-TAP screening surface to "drumhead tension."

SCREENS LIMESTONE, SILICA, GRAVEL  
AND OTHER ROCK PRODUCTS

In screening, tonnage-capacity and clean separation, depend upon a taut, smoothly stretched screening surface, effectively vibrated.

To attempt to vibrate a loose, baggy screening surface, would be like trying to play a drum without first bringing the drumhead to tension. In the WHIP-TAP Separator there is a direct, positive tension on both ends of every cross wire, and the screening surface is at all times maintained at "drumhead" tension.

The smooth, taut surface at "drumhead" tension permits an even flow of material over the entire screening surface, so that the unchecked vibration from the whip-hammers produces maximum tonnage and a clean separation.

WRITE FOR No. 38 WHIP-TAP CATALOGUE

## THE W. S. TYLER COMPANY

Manufacturers of TYLER "Double-Crimped" Wire Cloth and Ton-Cap Screen

CLEVELAND, OHIO



STONE AND GRAVEL ELEVATORS  
BELT AND PAN CONVEYORS  
FURNISHED COMPLETE

## We Have What You Need!

That is the knowledge of our patrons—that we can replace at a *moment's* notice, *any part* of their plant. You'll realize this fact if you send for our general catalog.

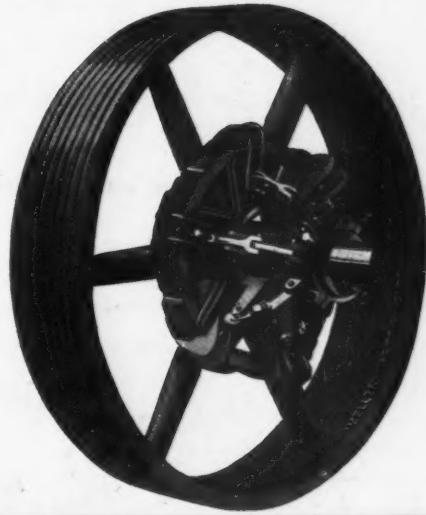
If you are interested in any specific piece of equipment, let us know. We will send comprehensive literature explaining what we have to offer. Don't delay.

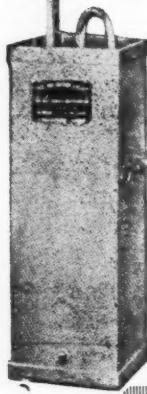
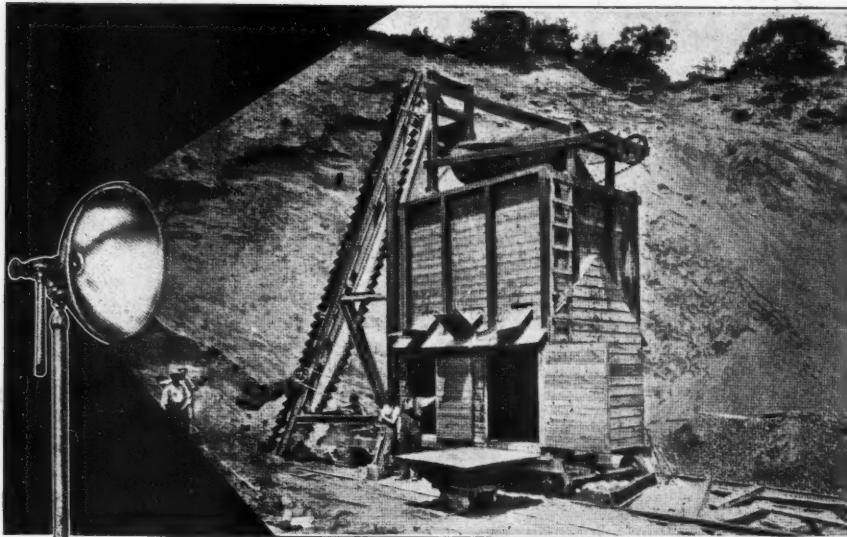
## WELLER MFG. CO.

ELEVATING, CONVEYING AND  
POWER TRANSMITTING MACHINERY

1856 N. Kostner Ave.

CHICAGO





Mines equipped with New Milburns are independent of dark days—Independent even of nightfall—for the wonderful New Milburn Lights, with capacity up to 25,000 candle power, give a powerful illumination that turns night into day.

*They cost from 1c. to 4c. an hour, depending on candle power.*

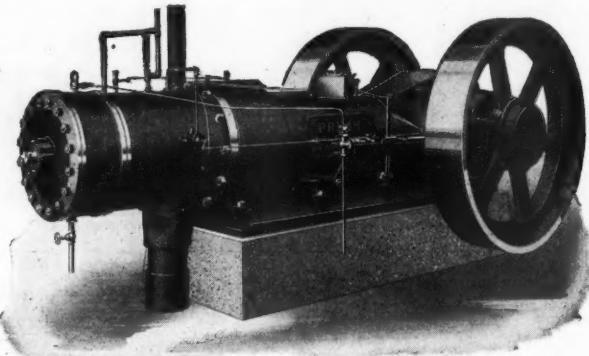
*They operate absolutely automatically and require no attention.*

*They don't overgenerate—and you CAN'T overcharge them.*

*They require only water and ordinary carbide, sold everywhere.*

*Circular 236 tells more about them!*

**THE ALEXANDER MILBURN CO., Baltimore, U. S. A.**  
**Manufacturers of Portable Carbide Lights and Oxy-Acetylene Apparatus**

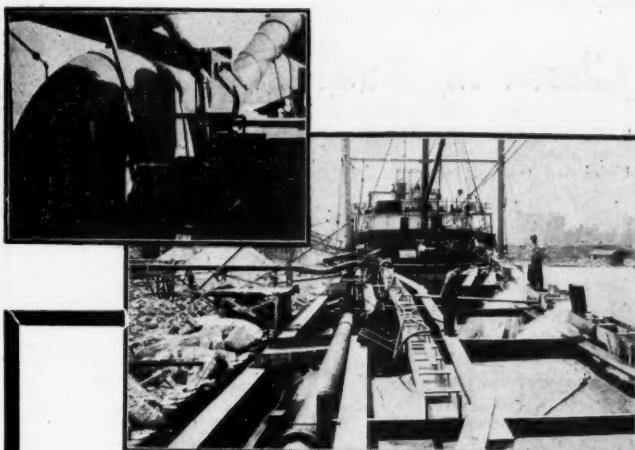


## PRIMM OIL ENGINES

### The Easy Running Oil Engine

2 cycle type and runs as steady as a steam engine. More noiseless in operation than gas and gasoline engines and is started more readily. Superior workmanship and right prices.

**THE POWER MFG. CO., Marion, Ohio**



## Two ERIE PUMPS

*Installed on This Boat save Labor and Time performing a Gigantic Task*

The Construction Materials Co., of Chicago, depend on the power of just one of these pumps to force 2884 cu. yds. of sand and water through 1200 ft. of 14-inch pipe to a height of 47 ft. in less than two hours' time.

The efficiency of these pumps enabled this company to fill the foundation site of the Field Museum at Chicago, requiring 250,000 cu. yds. of sand, at a big saving of both expense and labor in record time.

*Let us send literature of these dependable pumps*

**THE ERIE PUMP  
& ENGINE WORKS**  
MEDINA, N. Y.



## THREE ROLL MILL

YOUR best opportunity to increase the products of the land by providing agricultural limestone is obtained by installing the BRADLEY THREE-ROLL MILL, which produces a perfect limestone powder most economically. It takes  $\frac{3}{4}$  inch material (or smaller) and reduces it to a uniform, finely ground material in one operation. This result is accomplished at a lower price than is obtained by many mills which turn out coarser material.

*We will send full particulars and prices.  
Our engineers are at your service.  
Engineering of Agricultural Limestone  
Plants a Specialty*

**BRADLEY PULVERIZER CO.**  
BOSTON LONDON, ENGLAND  
Works: ALLENTOWN, PA.



Wash the waste rock! Get the mud out! Screen it! When you realize the useful material that is lying idle and useless in the tailings and screenings from your *limestone quarries*, you will resolve that it is not only a patriotic duty, but a profitable performance, to turn this great pile of waste material into a useful product—*agricultural lime*—for the benefit of the land, the glory of Uncle Sam—and your own advantage.

# DULL

washing screens are of paramount importance. They accomplish results where many make a bad bluff at it. Wash and screen your limestone waste with greatest economy.

**GET THE LIMESTONE OUT  
OF YOUR WASTE PILES—  
LET US SHOW YOU HOW**

**THE RAYMOND W. DULL CO.  
1914 CONWAY BUILDING**

CHICAGO

*Prompt attention will be given your inquiry if you mention ROCK PRODUCTS.*

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### BAGS AND BAG MACHINERY

Jaite Company, The  
Urschel-Bates Valve Bag Co.

### BIN GATES

Beaumont Co., R. H.

### CARBIDE LIGHTS

Alexander Milburn Co., The

### CALCINING MACHINERY

Atlas Car & Mfg. Co.

Butterworth & Lowe

### CEMENT, PORTLAND

Alpha Port. Cement Co.

Carolina Portland Cement Co.

Huron Wyandotte Portland

Cement Co.

### CHAIN AND TRANSMIT-

### TING MACHINERY

Stephens-Adamson Mfg. Co.

### CONVEYORS AND ELE-

### VATORS

Caldwell, H. W., & Son Co.

Jeffrey Mfg. Co., The

Webster Mfg. Company

Gifford-Wood Co.

Stephens-Adamson Mfg. Co.

Weller Mfg. Co.

### CRANES

Locomotive Gantry

Ball Engine Co.

Byers Mach. Co., John F.

McMyler-Interstate Co.

### CRUSHERS AND PUL-

### VERIZERS

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American Pulverizer Co.

Austin Mfg. Co.

Bacon, Earle C.

Bradley Pulverizer Co.

Butterworth & Lowe

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Gruendler Pat. Crusher & Pul-

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Stroh Steel Hardening Process

Co.

Traylor Eng. & Mfg. Co.

Universal Crusher Co.

Webb City & Carterville F. &

M. Works.

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Sullivan Mach. Co.

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Fuller Engineering Co.

Smith & Co., F. L.

Schaffer Eng. & Equip. Co.

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Dull, Raymond W., Co.

### FUSES

Ensign-Bickford Co.

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Caldwell, H. W., & Son Co.

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Best Bros. Keene's Cement Co.

Wheeling Wall Plaster Co.

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Kritzer Co., The

Mis campbell, H.

Schaffer Eng. & Equip. Co.

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Watt Mining Car Wheel Co.

### LIME, HYDRATED

Scioto Lime & Stone Co.

Woodville Lime Products Co.

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Weller Mfg. Co.

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Pierce-Arrow Motor Car Co.

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Du Pont de Nemours Co., E. I.

Grasselli Powder Co.

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Aero Pulv. Co.

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### SAND PUMPS

Erie Pump & Engine Works.

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The W. S. Tyler Co.

### SCREENS

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Sturtevant Mill Co.

The W. S. Tyler Co.

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The Osgood Co.

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### TESTING SIEVES AND TEST-

### ING SIEVE SHAKERS

The W. S. Tyler Co.

### WIRE ROPE

American Steel & Wire Co.

Leschen, A., & Sons Co.

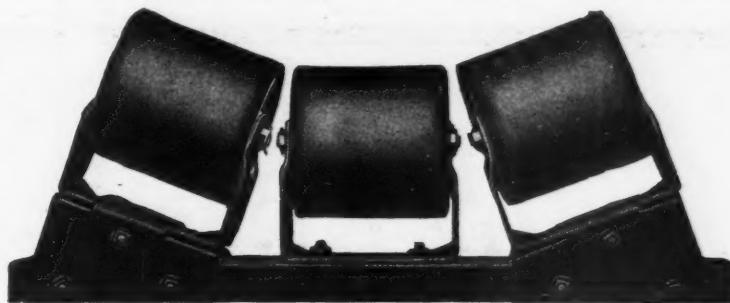
Waterbury Co.

### WIRE CLOTH

Audubon Wire Cloth Co.

The W. S. Tyler Co.

# Know this Carrier



You as an operator know what it means to constantly lubricate the Carriers of your belt conveyor.

You know the time it takes to grease the bearings and the expense incurred.

S-A Unit Ball Bearing Carriers operate for periods of one to three years without attention.

We advise inspection every six months, and lubrication if necessary.

## Consider the Saving

With remarkable ease capacity loads glide smoothly over S-A Unit Ball Bearing Carriers.

**They save power**—they run so easily and smoothly. **They save breakage**—their all-steel construction is so strong and durable.

**Know this Carrier.** Send for Belt Conveyor Catalog, Section No. 3.

**STEPHENS-ADAMSON MFG. COMPANY, AURORA, ILL.**

NEW YORK  
PITTSBURGH

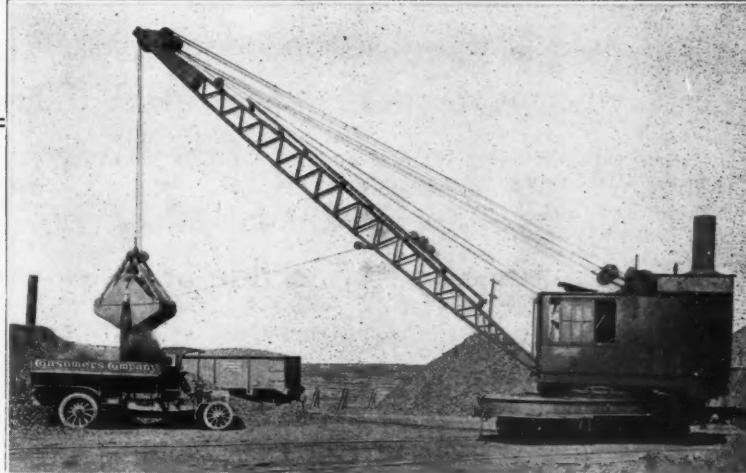
BOSTON  
HUNTINGTON, W. VA.

BRANCH OFFICES:  
ST. LOUIS  
CHICAGO

DETROIT  
LOS ANGELES

SALT LAKE CITY  
TORONTO, ONT., CAN.

**TO EFFICIENTLY**  
operate a 2-line clam shell bucket a locomotive crane must be capable of raising the bucket either in an open or closed position.



## McMYLER-INTERSTATE LOCOMOTIVE CRANES

are equipped with double power drums permitting the bucket to be raised or lowered when open. This feature is invaluable when handling material out of a rough bottom car, or when operating under any like condition.

Possibly McMyler-Interstate cranes do

cost a little more but remember that you are paying for refinements such as this which make for efficiency.

**THE McMYLER-INTERSTATE COMPANY  
BEDFORD, OHIO (CLEVELAND SUBURB)**

BRANCH OFFICES  
1756 Hudson Terminal Building  
New York City 1503 Fisher Building  
Chicago, Ill.

# A WAR MESSAGE

## TO WHITE TRUCK OWNERS

---

THE use and demand for White Trucks in war service by both the United States and French armies has reached such proportions as to seriously affect deliveries of commercial units until production at the factory overtakes urgent military needs.

While this will delay the immediate filling of commercial orders, there will be no interruption in the making and distributing of parts, which will continue to be supplied as promptly and as abundantly as ever. White Service will efficiently provide for the many thousands of White Trucks operating in all parts of the country.

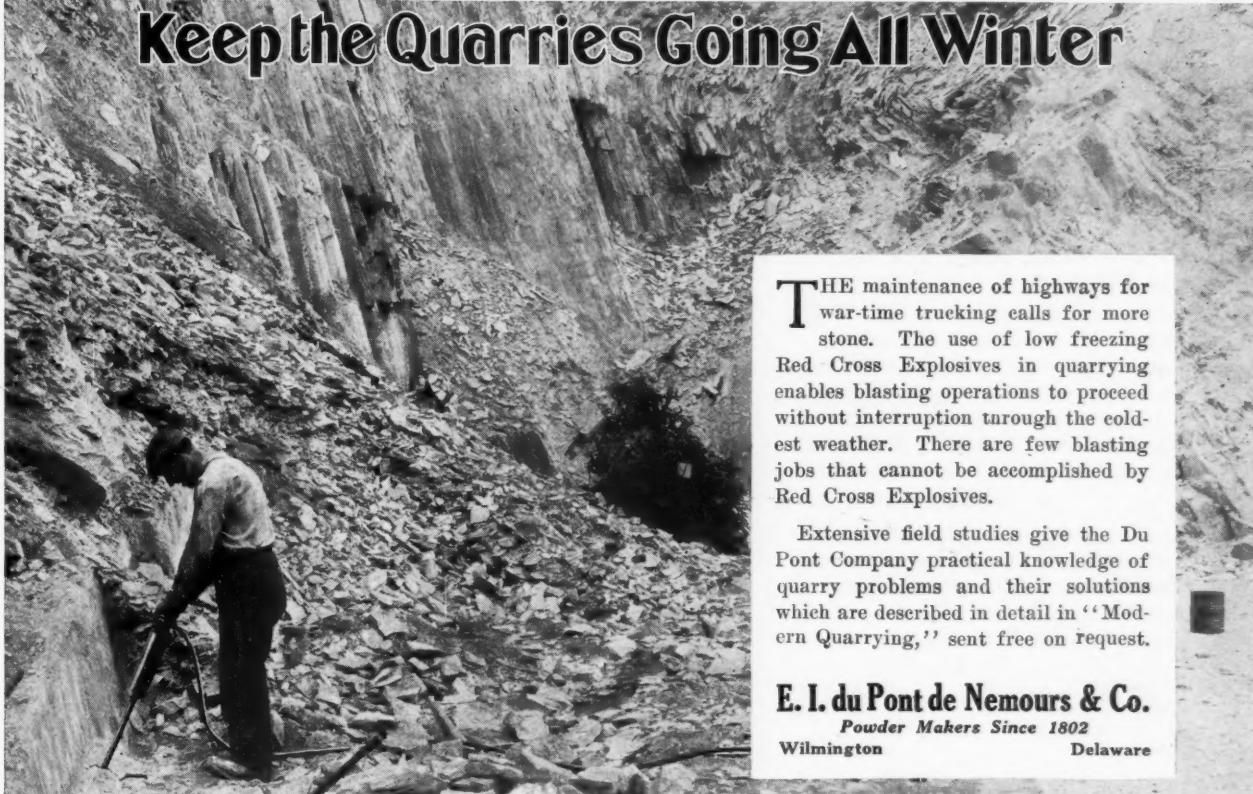
The company makes this public explanation for the assurance and protection of its innumerable customers and prospective customers, in the confident belief that they will recognize and approve a course of action which puts the national welfare first.



**THE WHITE COMPANY**  
CLEVELAND

DU PONT AMERICAN INDUSTRIES

## Keep the Quarries Going All Winter



THE maintenance of highways for war-time trucking calls for more stone. The use of low freezing Red Cross Explosives in quarrying enables blasting operations to proceed without interruption through the coldest weather. There are few blasting jobs that cannot be accomplished by Red Cross Explosives.

Extensive field studies give the Du Pont Company practical knowledge of quarry problems and their solutions which are described in detail in "Modern Quarrying," sent free on request.

**E. I. du Pont de Nemours & Co.**  
Powder Makers Since 1802  
Wilmington Delaware



# Kilns

## Vulcan Iron Works

WILKES-BARRE, PA.

Experienced in designing and manufacturing Rotary Kilns for calcining of Lime, Cement, Dolomite, Magnesite, etc., together with their auxiliary equipment of Dryers and Coolers.

Drying installations for sand, all grades of rock, silica, and other materials requiring special treatment.

Quarry, Industrial and Long Haul Locomotives of all descriptions

**Tough—Strong—Safe—Durable**



IT is of more importance to you Wire Rope users to know what kind of rope will give you the best results than to know the reasons for its superior service.

We are glad to let HERCULES (Red Strand) Wire Rope demonstrate its ability. Why not place a trial order? Many other Wire Rope users have done so, and are now using it exclusively to their profit.

*Inquiries appreciated*

**A. Leschen & Sons Rope Co.**  
St. Louis, Mo.

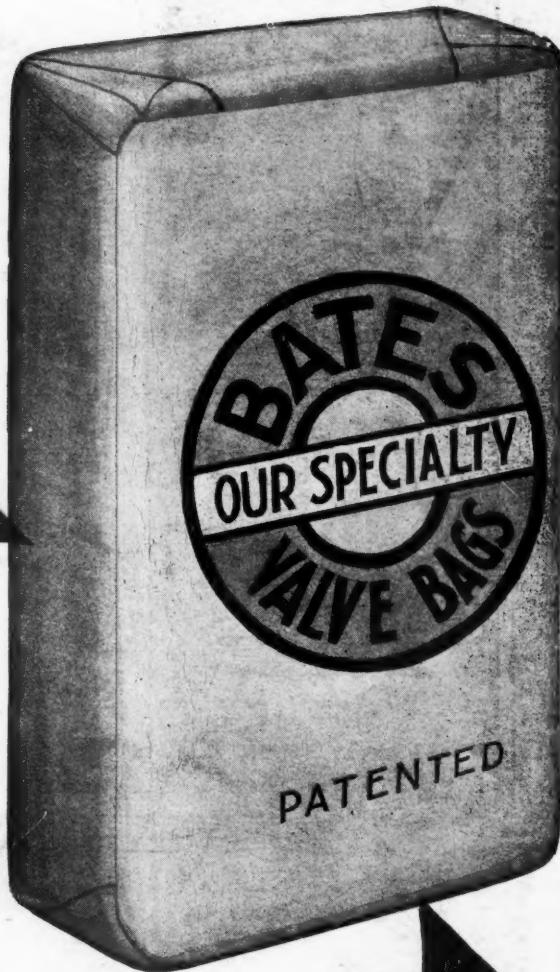
New York Chicago Denver Salt Lake City San Francisco

*Saying "I saw it in ROCK PRODUCTS" will bring quick action.*

**"Increasing the  
Production  
Was Harder  
Then  
Than Now—**

—but there wasn't much use in speeding up when it was so difficult and so expensive to take care of the product.

—but now we can take care of the stuff as fast as we can produce it, thanks to the



# BATES VALVE BAG

and the wonderful self-sealing, bag-filling system." This is a composite remark from hundreds of owners who grew up in the business and who now use the Bates Valve Bag.

If YOUR plant is a steady producer of lime or any other product that requires bagging in such a way that the contents will be intact when the destination is reached—if you want to economize on space for stacking—better learn about the Bates System.

**URSCHEL BATES  
VALVE BAG CO.  
TOLEDO, OHIO**